COMPUTER GAMING WORLD

Presents

SID MEIER'S

CIVILIZATION™

OR ROME ON 640K A DAY

THE AUTHORIZED GUIDE

JOHNNY L. WILSON AND ALAN EMRICH

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OR ROME ON 640K A DAY

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Alan Emrich

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Johnny L. Wilson wishes to dedicate this book to his biological brothers, David and Douglas, and his "adopted" brother, James. The family tradition of having incessant debates on any and every subject kept his mind in shape to complete this book.

Alan Emrich wishes to dedicate this book to those who have most inspired him. Namely, everyone who has ever thought that he would *never* amount to anything, and to that very special tall, thin, beautiful, older blonde woman who always knew that he *would*.

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Foreword

The manual and other documentation that accompanies entertainment software can only serve as road maps to the intricacies, challenges and surprises that are, hopefully, hidden within the game. The software itself, and the strategies and tactics of play, continually evolve past the point of production.

We think this is especially true for *Sid Meier's Civilization*. This design was certainly evolving up to the last moment. Early returns from the public are revealing styles of play and clever ploys that we never considered.

Luckily for those of you enjoying this game already, or those just beginning to explore it, Johnny Wilson and Alan Emrich have written this entertaining and fact-filled guidebook to explain everything, *everything*, you might want to know about *Sid Meier's Civilization*. If the documentation that comes with the game is the road map, then this guidebook is where you can turn to learn the best places to get a burger and fries, where to sight-see and what tourist traps to avoid.

Johnny met with us concerning this book for the first time in the spring of 1991. Since that time, he and Alan have been kept informed continually on how the game was evolving. They actually became *part of* the development process. They found a number of errors that we were able to correct and a few of their suggestions were adopted into the final version. (If you like the fact that your Barracks go away after the discoveries of Gunpowder and Combustion, you want to thank Alan.)

This guidebook draws on interviews with us, the experience of many hundreds of hours of playing and the reports of *Sid Meier's Civilization* devotees around the country. It provides a detailed analysis of what is going on inside the game's program, an understanding of what to expect from the enemy artificial intelligence and a rich list of suggestions for improving your play.

If you are mired at the Warlord level and tired of being wiped out by Barbarians or the meek Americans, this book can help you break out. If you haven't been able to master the economic management of a large civilization, this book can help balance your checkbook. If you find yourself continually behind in the technology race, this book can help turn on those light bulbs.

We are very pleased that both Johnny and Alan liked *Sid Meier's Civilization* to the point of suggesting, researching and writing this guide. It has something to offer for everyone who owns the game and wants to become a more informed player. We strongly recommend it.

Sid Meier and Bruce Shelly
February 3, 1992

Acknowledgements

There are several individuals that the authors would like to gratefully acknowledge in print. The following is a list of some of them, along with a brief description of their specific assistance.

We wish to thank Sid Meier and Bruce Shelley for giving us such a wonderful game. Sid suffered through the double burden of designing *Sid Meier's Civilization* and taking Alan's daily telephone calls rife with questions, comments and suggestions. Sid truly suffered the "slings and arrows..."

We wish to commend and compliment Russell Sipe, who proved it was possible to be a publisher and *still* get his hands dirty as an art director. The layout work on this book and the graphics designed to give you a humorous break from our prose, contributed greatly to its overall "look and feel," as well as to our excitement about the book.

Special kudos are also warranted for Caitlin Ackelson for her assistance as Grand Exalted Arbiter of Style. Her red ink saved us from many experiences with red faces. In the same way we are grateful to Laurie Beaulieu and her persistent quest for the grail of consistency that pulled the divergent styles of two maverick authors into a unity.

Also, the efforts of Tom E. Hughes, Jr., whose mathematical analysis and probing questions contributed to the inclusion of many tables and their subsequent explanations in this book, are greatly appreciated by the authors.

In addition, Perrin Tong, who helped Alan in cross-checking many of the facts in the "Pyramids of Progress" section of this book; Mike "Moondawg" Weksler, who helped with some of the "hacking" techniques hidden away at the end of this book; Roger "-Tzu" White, whose repartee after the game's release re-inspired the authors to dig even deeper and find even *more* interesting things for players to try, and Kyle Bartlett who

contributed the "Data Entry Icons" information in Chapter 10, are all to be recognized for their unique contributions to the quality of this book.

Chapter 1

How We Spent Our Computer Vacation

Sid Meier's Civilization is a Mount Everest-style challenge to any person with even a slight sense of history. It offers the promise of collapsing the broad horizon of humankind's history into a focal point of experiential understanding where you, as leader, have the chance to visit and change the past. From Mark Twain and H. G. Wells to Robert Heinlein and Robert Silverberg, writers of fiction have tapped into an almost universal desire to travel back into time. (Both of us are particularly fond of Simon Hawke's *Time Wars* series of books which exude this theme). If the unified field theory of modern physics is true, as these fictional expressions of a very real longing suggest, we ought to be able to experience antiquity and understand it better.

In a very real sense, *Sid Meier's Civilization* is a time machine. While it does not physically transport us back to the formative events in the history of human civilization, it challenges us to recreate those flash points of development by conjuring memories of historical facts and perceptions which we must use to face those identical challenges. As the science fiction author, Clifford Simak, speaks through his protagonist in *Mastodonia*, a historian who could actually travel back in time and encounter historical personages in the context of actual events "would understand it better and could write better histories." Simak's character decides that the risk of interference which might destroy the time stream is too great if his travel agency books tours in recorded history, so he strictly takes tourists into pre-history. Via the computer, Sid Meier has taken the risk of booking computer gamers into tours of recorded history. He *wants* us to mess up and learn to count the costs of failure, as well as to succeed and understand a lesson.

Why This Book Is a Travel Guide

Doesn't anybody here speak modern?
— Geoffrey Chaucer?

The British historian, David Lowenthal, published a book entitled *The Past is a Foreign Country*. It offers plenty of wisdom about our need to understand the past, our nostalgic desires to return to the past and the difficulties involved with disentangling the past from the present. The metaphor expressed in the book's title is a haunting one. It underscores that the past is separated from modern man by distance, culture, technology, language and knowledge in much the same way that the citizens of one country are separated from the citizens of another. With history, the distance is measured in years instead of mileage and cultural differences in terms of anachronism rather than racial/geographical customs, but they all represent gaps to be bridged in order to reach a better understanding of *every* culture.

So, we decided to write this book as a travel guide. We structured it as though you were going to visit a foreign country and have tried to give you the kind of advice you would need before leaving on a journey, while on the trip and after you get home from that adventure. In fact, we suspect that just as a well-written travel guide may keep you from missing some significant attractions in a foreign country, this book (particularly in the last portion of Chapter 10) may keep you from missing some very entertaining and little known aspects of *Sid Meier's Civilization*.

Each chapter is designed to help you with a different section of the game and begins with some general remarks on what the chapter is covering, while finishing with a short synopsis of what you should have learned. Chapter 2 gives you some basic tips on getting started and playing your first game. We think it is analogous to getting your passport and visa in order before making airline reservations. Chapter 3 explains the structure of the global map, different types of terrain and how you can use this knowledge to your advantage. We compare this to planning your itinerary. Chapter 4 talks about cities. It explains the various improvements you can build to improve

your cities and seems to us like the city descriptions you would find in a detailed travel book.

Chapter 5 is a reference section on every technological advance which you can choose in the course of the game. We think of it as equivalent to a list of sights which you could see in a given country. Chapter 6 is similar to Chapter 4, except it deals with the *national* governments in the game instead of the *civic* governments. It lets you know what to do if you get into trouble during your visit back into history.

Chapter 7 gives you a guided tour of the battlefields in the game (telling you how to run a military campaign successfully) and Chapter 8 gives you a site-by-site docent tour of the Wonders of the World which you can build in the course of the game. Think of these two chapters as the "Things to Do" chapters.

Finally, Chapter 9 brings you back home with some pointers on winning the game and evaluating your performance. Then, Chapter 10 reflects on the new understandings you should have gleaned from your trip, both in terms of historical insight and game experiences. Think of these chapters as inviting your friends over to see the slides or watch the videotapes of your trip.

Now, we also wanted to make the book entertaining. After all, the reason we keep coming back to play *Sid Meier's Civilization* is because we enjoy it each time we do. So, we have structured every major section so that it has: a mundane title that simply describes the paragraphs which are to follow; a *faux* (phony) quote that usually relates to the subject of the section in some bizarre way and a *faux* attribution so that we suggest some of the most unlikely characters in history (and, occasionally, in fiction) as having made those statements. In addition, you will find occasional irreverent asides from the authors and some clever "editorializing" by the art director.

The book is also intended to be *helpful*. Every civilization advance in Chapter 5 and wonder in Chapter 8 has a full-page chart to help you visualize its advantages and disadvantages. These charts are presented alphabetically, with large text along the margin so as to serve as handy "flip to" reference

sections which you can use during play. In addition, every section of the text is listed in the Table of Contents and every table is referenced on a List of Tables (page ix).

Why Sid Wrote the Game

Because it wasn't there.

—Sid Meier?

Sid Meier isn't satisfied with the *status quo* in computer games. He isn't even satisfied with his own games. So, after he had been working on flight simulations for years (with only occasional time off for good behavior in order to design *Pirates!*), he wanted to try some new approaches. He took some time off to go to Europe and, while he was there, came up with the ideas for *Railroad Tycoon* and *Covert Action*.

Railroad Tycoon was, by Sid's own admission, inspired by *SimCity*. Sid loved the accessible interface and the constant updating of the game map. What he didn't like about *SimCity* was the fact that there simply wasn't enough of a competition element to satisfy him. In *Railroad Tycoon*, he added that competition element with the computer opponents.

With the success of *Railroad Tycoon*, Sid wanted to do another game that combined the strengths of *SimCity*'s real-world model with *Railroad Tycoon*'s cutthroat competition. One idea was to model the whole thrust of western civilization. Now, Sid was aware of **Avalon Hill**'s famous boardgame, *Civilization*, but he thought he could make a more detailed model than it had. He and Bruce Shelley began to enumerate the advances which they believed had the most impact on the development of civilization and Sid began to implement the game mechanics. At various times, they had many more advances than are currently in the game. They took out Fermented Beverages (even though the Egyptians had a heavy reliance on beer and most other civilizations put a high priority on wine) and Microprose Software (after all, they haven't found a platform stable enough to last centuries, as of yet), among others.

As the game's development progressed, Sid would write code every night and bring in a new build of the game for Bruce

almost every day. Bruce would play the game, write documentation notes, make suggestions and confer with Sid. Then, the process would start all over again. In fact, Sid continued to change the design, even after Bruce had finished writing the documentation. Part of this continuing update was due to Sid's artistic temperament (he wants to build a perfect product), but part of it was due to the prodding of Alan Emrich as we played the game while researching this book. We love games and we just can't help making suggestions.

During an early period in the game's development, Johnny Wilson was visiting **Microprose** with regard to another product. He took the opportunity to visit with Sid and receive his first build of the game during that visit. Sid answered two very important questions at that time. First, Sid assured us that he did not have a political axe to grind. He was designing a *game* and, even though there were factors like the theory of global warming built into the model, he was not trying to "preach" through the game. He thought that the underlying agendas in *SimCity* and *SimEarth* might be too obvious and he hoped the choices he made in creating the historical model would not be as overt. Ironically, Sid has such a diverse model that he can be shot at from the liberal and conservative side of the spectrum, respectively. (Bet you wonder how we know that....)

Second, Sid explained his philosophy concerning solitaire games. He stated that multi-player games with more than one human on the same computer will never work. He was opposed to the lag time involved when another player is at the keyboard. He wanted the player to be getting feedback, see things happening and be able to input moves at any time.

Asked why he did not set the games up for modem play, he noted that, even with direct or modem connections, there would very likely be lag time. Further, he was not convinced that there were sufficient numbers of computer gamers who really wanted to play by modem. After all, the advantage of a computer game is *not* having to find an opponent. So, Sid's goal has been to make the artificial opponents *seem* like human opponents whom you are playing against in order for you to

have a simulated multi-player experience *without* having the responsibility of finding opponents.

Bon Voyage

I know I put those tickets somewhere.

— Marco Polo?

In this chapter, we have talked about *Sid Meier's Civilization* in terms of time travel and explained how that concept is valuable. We have also explained why we have written the book as a travel guide, outlined the direction we are going and told you something about the history and philosophy of the game. Now, in the lyrics of Huey Lewis, it's time to go "back in time!"

Chapter 2

Getting Your Passport

What to Know, Before You Go

While players who are already familiar with *Sid Meier's Civilization* might be inclined to skip past what is essentially the tutorial section of this book, we recommend that you do not. This chapter includes useful tables for unraveling the riddle of time, a close-up on using Settler units as engineers, secrets to the game's difficulty levels, and player handicapping. Taking this brief walk-through will be more revealing than you might first imagine.

Getting Started

Why? Doesn't God play dice with the Universe?

— Nathan Detroit?

New players might want to work through this chapter for a "hands on" experience. To do this, start up the game and select EARTH from the opening menu. After reading the opening text ("In the beginning...") for the hundredth time, there are two alternatives to choose from. First, you can press any key and the text will cease *after* the computer generates the world (which may take a while on slower machines, so be patient). The second option can be found in Chapter 10 under the heading "Sid Meier's Easter Egg Hunt," where you will learn how to write your own custom opening text, which will probably be much more interesting to read.

The first question posed to the player, immediately after the world creation process, is designed to determine the difficulty level at which to play. For purposes of this tutorial walk-through, you should select the easiest level, Chieftain. For the curious (or experienced) player reading this, Table 2-1 shows the effects of each of the various difficulty levels upon game play. (After becoming familiar with the game, this will

make a lot more sense, so beginners shouldn't worry too much about this now.)

Table 2-1. Difficulty Levels

Features	Chieftain	Warlord	Prince	King	Emperor
End of Game Turn	2100	2080	2060	2040	2020
Starting Funds	50	0	0	0	0
Content Citizens (a)	6	5	4	3	2
CP Rows in Food Storage Box (b)	16	14	12	10	8
CP Resource Costs Multiplier (c)	1.6	1.4	1.2	1	.8
CP Light Bulb Increment per Advance (d)	14	13	12	11	10
Player Light Bulb Increment per Advance	6	8	10	12	14
Barbarian Unit Attack Strength Multiplier	.25	.5	.75	1	1.25
Parley Coin Demands Multiplier (e)	.25	.5	.75	1	1.25

NOTES:

In most respects, the computer players are playing at the King difficulty level. The quantity of Palace Improvements is also modified by difficulty level. While Palace Improvements are based on one's Civilization Score (not merely on population as the rules state), a given score playing at the Emperor level will award a player with *more* Palace Improvements than that same score will at the Chieftain level! See Chapter 9 for more detailed formulae on this subject.

a) The number of people who will be created in a city who are born content. New citizens added to the city beyond this number will be born unhappy, requiring either a city improvement, wonder, luxuries or entertainers to mollify them and prevent unrest.

b) The number of rows in the computer player's Food Storage box (i.e., how long it will take for a city to grow). The number of rows in the human player's box is always 10.

c) All computer players have their costs to build units and city improvements multiplied by this amount. For example, a Militia unit would cost the computer players 16, 14, 12, 10 and 8 at each increasing difficulty level.

d) See Chapter 7 for details, but the smaller the number, the faster Advances will be made.

e) In a parley with another leader, often they will demand payment for peace. It's a complex formula explained at the end of Chapter 7. Note that, at the Chieftain difficulty level, enemy leaders *always* offer peace (i.e., it is the same effect as if the player permanently has the Great Wall or United Nations wonder).

Number of Players

Trust no one.

— Will Rogers?

The next question determines the level of competition desired, in terms of the number of other civilizations (other "players") that will be represented in the game. In other words, how many opponents you wish to face across the "game board." Select 4 Civilizations. Upon making this choice, you will be confronted with a list of all the possible civilizations that might appear in the game and given the option to select one. Go to the bottom of the list and select Aztecs. Either keep the

name of Montezuma or type in an appropriate name for yourself and then hit the **ENTER** key.

It is important also to note that the number of civilizations chosen can significantly impact the final score. When you choose an initial number of civilizations that is below seven, your potential bonus for conquering the world (normally 1,000 points) is reduced by 100 points for each civilization below the optimal seven nascent civilizations. Of course, all of this is explained in Chapter 9, "Have We Shown You Our Slides, Yet?"

> ***Mongols by Any Other Name...***
>
> Press the **ESC** key when it comes time to select which civilization to play. The computer will put a civilization name in the window, allowing the player to type over that name with a "custom" tribe name like the Hittites, Surfers, or Martians, for example. Note that the player will bear the color (and hear the music) of the original civilization that the computer chose at random and, therefore, its identically colored cousin will never appear in the game (see Chapter 7).

At this point in the game, you are informed of your role as leader of the Aztecs. Included in this declaration is the fact that the Aztecs begin with the knowledge of road building, irrigation, and mining (aka, the basics), which are all standard engineering functions for Settler units.

On some occasions you will be given one or more advances, like Pottery, The Wheel, or The Alphabet. You might even begin with two Settler units, instead of only one. When this happens, it is merely the computer handicapping every civilization based on its starting location. While Grassland would be a neutral starting square, a River starting square gives you a small advantage at the start. A Plains starting square would be disadvantageous. Table 2-2 lists the starting location handicaps, both good and bad.

Table 2-2. Starting Location Handicaps

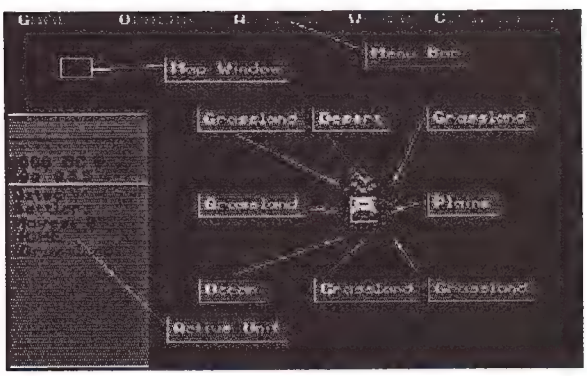
GOOD	BAD
River	Grassland or Plains
Big continent	Small island
No civilizations close	Other civilizations close

The First Move

A fellow could really plant roots here!

— Marco Polo?

The first screen that appears is the Map display. Notice that in the center of the (large) Map window, there is a covered wagon (Settler unit) blinking away. Next to it is the current extent of the known world, with the terrain types shown by lines and boxes. Go ahead and savor the moment. It's all uphill from here.



The computer places each player's initial Settler unit(s) in a likely spot to found a city and offers the following advice:

Your first task is to find a suitable site and found your capital city. The best city sites are near rivers, grasslands, coastal areas, or areas near special resources.

Often, you will want to wander a square or two from the starting position, just to see if there are greener pastures nearby. For purposes of this tutorial, however, build a city right away. Either select Found New City option from the Orders menu or just press the **B** (shortcut) key. The computer will suggest a name for the city (you can type in any name desired within the space allotted) and, once the name is set and the **ENTER** key pressed, you will see the roaming tribes settle the land and build the first crude beginnings of a mighty city. Next, the computer informs you:

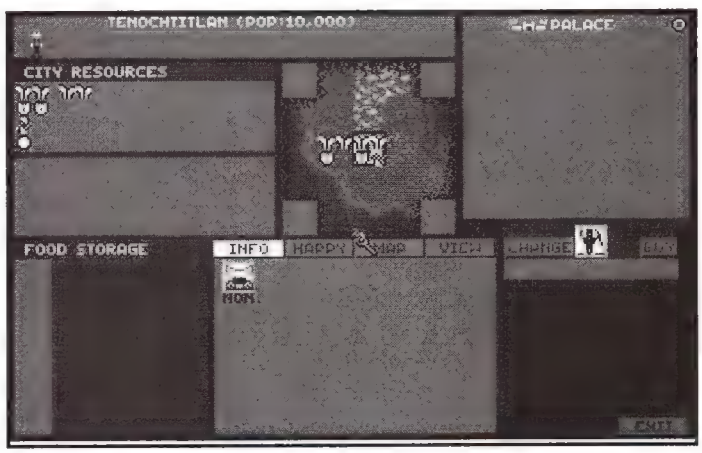
> *Each of your cities can build additional settlers, military units, or city improvements to further the growth of your civilization. Only one item can be in production per city, production orders can be changed any time. Select the item you wish to build by clicking the CHANGE button in the city information screen that follows.*

The City Display is where most of the crucial decisions will be made concerning the ultimate viability of any civilization. Having at least as many happy people as unhappy people in the Population Roster (to prevent revolts) and keeping a positive food supply (to spur population growth) and resource supply (to create improvements, wonders, and military units) in the City Resources window is the long term goal of the game. Knowing what to build and when, and how to optimize production and expansion, are all key elements that will be discussed in later chapters of this book.

Sitting at the Mayor's Desk

Government: buy the people, gull the people, fool the people.
— Boss Tweed?

For right now, though, let's try a couple of fun experiments. First, put the cursor over on the City Map display (the P key if using the keyboard commands). Notice that the city is located in the center of this map and consists of one content citizen (the little guy in the top-left corner) who is currently working the land in some square other than that of the city itself.



Notice that the city is currently producing four food units (the wheat stalks); two to the left of the break (being consumed each turn by the city's one population point) and two to the right of the break (the surplus being used to fill the Food Storage Box, see page 69 of the rules book). There is probably a resource (shield) or two being produced, as well as a unit of trade (the two arrows banded together). The game begins with a 50% tax rate, so the arrows are being converted into a coin right now.

So, click on the square of land being worked. Poof! It ceases to be worked and an Entertainer ("Elvis") appears in the top-left corner. Select a different square of land near the city, and Elvis

reverts into a contented laborer working that land or ocean square. Repeat this for each adjoining square and be careful to notice that each produces different amounts of food, resources, and trade. In the next two chapters, the secrets of world creation, terrain usage, and city planning will be revealed, but for right now, put the workers on a suitable square (presumably, the one where they started in the first place—the computer is pretty good, although not perfect, about judging optimal terrain usage) and let's move on.

The second experiment is to select the CHANGE button on the City Display (the **C** key for keyboard users). Three boxes will open. The important one is at the top, in the center of the screen. It shows you what the city can build at this time. Beneath it, to the left, will be the advice of the Military Advisor, urging, "We should build Militia to defend our cities." The Domestic Advisor, in the lower-right hand corner suggests, "We should build a Barracks to produce veteran units." This time, select the Militia unit. Click on the Exit button (the **E** key) and, once back in the Map Display, press **ENTER** and end the turn.

You can also experiment with putting your city into automatic improvement mode (as explained in the "Even more additional IBM features" supplement to the game). By pressing the right mouse button over the word CHANGE (or by pressing **shift-A** in the keyboard only mode), the computer will build up the city automatically. It will use the same artificial intelligence (AI) that it uses to build the computer player's city improvements. However, cities in automatic improvement mode will *not* build wonders, create military units or deal with civil disorder. You must manually override the computer in order to accomplish any of those objectives. Still, it does provide you some insight into the way the computer thinks, and can be useful at a later point in the game when you are starting new cities that need not be monitored until they've grown up.

How the Game Handles Time

It's about time!

— Dr. Stephen Hawking?

Here is a brief history of how time works within the game. After hitting the **ENTER** key and ending the first turn, the alert player will have observed that the date in the Status Window moved from 4000 B.C. to 3980 B.C. Twenty years just ticked off with the stroke of a key. For all game purposes, a turn is a turn. For players who care about historical progress, however, here are the five different segments of time (or epochs) in *Sid Meier's Civilization*:

Each game turn in *Sid Meier's Civilization* represents a variable number of years as shown in Table 2-3.

Table 2-3. The Passage of Time

Dates	Years Per Turn	Total Turns In Epoch
4000BC - 1000AD	20	250
1000AD - 1500AD	10	50
1500AD - 1750AD	5	50
1750AD - 1850AD	2	50
1850AD - 2100AD (a)	1	150

a) The end date is variable based on the difficulty level selected. See Table 2-1.

Now pop back into the city and look at the City Display. You should notice a couple of things. First, there should be some food beginning to accumulate in the Food Storage Box. Second, there should be shields (resource units) accumulating in the Production Box. Select CHANGE and switch the Militia production to Barracks. Now switch it to Settlers. Notice how the Production Box changes, but the shields in it are not lost. This will be important later in the game. Put it back on Militia and select the BUY button just above the Production Box (the **B** key). A window will pop up showing how many coins must be spent to have the unit appear first thing next turn. For each shield required to finish the job, the cost is two coins to rush production. The computer will remind you of the funds currently available in the treasury and, if they are sufficient, offer the chance to pay the money to finish the job post haste. Don't do it, but be *aware* that it can be done in a pinch.

Militia Management

You have the right to bare arms.

— Venus de Milo?

Get out of the City Display and hit **ENTER** a few more times, knocking off turns in the process, until the Militia unit is built. At that point, a message should appear reading:

> *You have just built your first Military unit. Use the keyboard arrows to move this unit and the Orders menu to give special commands. Military units allow you to explore, expand, attack, and defend your civilization.*

While that is all quite correct, and it is all right to do a bit of local exploring with that first Militia unit, keep in mind that having a city so close to the water often makes it that much more vulnerable to sudden attacks from barbarians landing from the sea. Therefore, a *second* military unit (at the least), should be left in the city to defend it. General Principles #1 will soon appear stating, "Defend your cities with at least one (preferably two) good defensive units."

To help in their defense of the city, units should generally use the Fortify (**F** key) command (see the tips in Chapter 7 for specific techniques in defending cities). This will increase its defense strength by 50%. Consequently, the computer will advise: "Fortify units in your cities to defend them against barbarians or enemy armies."

Exploration

Which way did they go?

— Lewis & Clark?

When exploring, always try to move to a space that will yield the most information. Remember, the object of exploring is to remove the most black squares possible while establishing the coastlines of the continent or island on which you are located. Moving along the coastal squares will reveal one square out into the oceans, in case there are any Fish terrain squares nearby. While exploring out over the water, a sharp eye might be able to detect faint traces of a land square on the other side.

Look for the very small but significant tell-tale signs of land across the water. You will need to develop the keen eye of Columbus' lookout, but it will be worth it to know that building a trireme at an early point will be rewarded with a nearby land mass to explore (and conquer) right away.

While exploring, always keep an eye out for future city sites. The name of the game is growth (well, actually it's *Sid Meier's Civilization*, but you know what we mean), so planting new cities and raising them up is a paramount concern. Rivers and grasslands offer the most promise, particularly ones near special squares such as Game, Gold, Oil, etc. Later, move Settler units to these tracts of prime real estate.

Scientific Advances

It my latest invention. Called 'Wheel.'

— Pat Sajak?

At some point, your city will produce a second unit of trade, and light bulbs will be generated. Immediately thereafter, a note from the computer states:

> *Cities also act as centers for trade and the flow of information. Your wise men and scientists can collect this information to acquire important new abilities and skills for your civilization. Use the following menu to direct their studies:*

This, of course, is followed by a menu showing the possible research projects for a civilization to commence. While scientific research and development is more clearly defined in Chapter 5, for now, know that a little invention goes a long way in *Sid Meier's Civilization*. Each new item discovered by your civilization is the building block to greater success in the game. An advance might open avenues for further advances, allow the player to construct new units, city improvements and wonders of the world, or make obsolete certain units and wonders of the world. Later in the game, they also have an impact on pollution and can even earn you bonus points on your Civilization Score at the end of the game for achieving

Futuristic Advances. All of this is brought into close-up perspective in Chapter 5.

For the time being, however, do whatever your scientific advisor says. Presumably, he'll recommend either researching Pottery (so that Granaries can be built for faster city growth) or the Alphabet, which is the gateway to many other Advances. Select either of these two, and research the other one next. Beyond that, be sure to get Map Making so that you can experiment with sea travel via the Trireme unit. Ceremonial Burial, Code of Laws (which requires the Alphabet) and Monarchy (which requires the two aforementioned discoveries) also should be top priorities. Soon your government will need to be changed to Monarchy.

When the capital city grows to a size of three, four or five, it is time to build Settler units and colonize the continent. By now, the exploring land units (you *did* build at least one other, didn't you?) should have surveyed some likely locations. Somewhere along the line, General Principles #1 will announce: "Strike a balance between improving your existing cities and striking out to found new cities. Don't expand beyond your ability to defend yourself; barbarians and hostile armies may appear without warning."

Here, the computer is downright helpful with advice on what to do with new Settler units. As one of them leaves the capital city, the computer will often let you know that improving the landscape is a good idea with such statements as "Settler units can found new cities as well as building roads, irrigation, and mines." More specifically, you will be given a square-by-square analysis of the local terrain and how it could be improved to help a neighboring city. These bits of advice will be given when a Settler unit begins its turn in suitable terrain:

> *This area could produce more resources. Mining ('m') these hills will add to the production capacity of [CITY NAME].*
>
> *This would be a suitable area to build irrigation ('i'). More food will help the city of [CITY NAME] to grow more rapidly.*

This would be a good place to build a road. Your units will be able to move faster and more trade will be generated in the city of [CITY NAME].

Don't waste time irrigating the land or mining anything (other than a Coal square) right now. Your government is Despotism and these won't help until you have achieved at least a government level of Monarchy. Roads are good, however, and should be built on every Plains and Grassland space that is currently being worked by the city. After the roads are in place, go found some new cities.

Colonization

All right, except for the desert wasteland, salt marshes and huge boulders, what's wrong with it?

—Frank Lloyd Wright?

In order to expand and grow, you need more cities. That means they must be either conquered or built. For now, build them. Chapter 7 will tell you how to conquer them, although the computer will tip you quickly to "Attack your enemies with Legions, Chariots, and Catapults." When considering changing production, you will at some point be advised, "We should build Settlers to colonize this continent." That usually means that it's a good time to do so.

When you move a Settler unit to a likely spot to found a new city, the computer will chime in with: "This spot seems like a good site for a city. Select 'Found New City' from the Orders menu or use the **B** key to found a city here." Well, there is more than *one* likely spot around a given area to found a city, and it is up to you to get a *feel* for where the best location might be.

Some important considerations might include:

- Proximity to the sea in order to create a port that can build ships
- Availability of Grassland, River and Oasis spaces in order to irrigate them for maximum food yield

- The vicinity of Hills to exploit natural resources through mining and increase economic resources
- Accessibility to special resource squares (which should *always* be a priority)
- When taking the *long view* of the landscape, remember that swamps and jungles can be cleared (by Settler units) and the terrain converted into something more useful. Forest and Plains squares are usually neither great helps or hindrances long term. Naturally, the more special terrain squares (Gold, Oil, Fish, Game, etc.) nearby, the better. Because of the terrain design algorithm built into the game, the maximum number of special squares that a city can possess is four, so any city site within reach of more than one is doing quite well
- Build up subsequent cities like the first one, with a defending unit and Granary as top building priorities.

Upgrading the Government

When she lost her head, I called it my crowning achievement.
— Henry VIII?

General Principles #2 (see Chapter 7) offers the following advice: "Think about changing your government to Monarchy once your cities reach sizes of six or seven." This is quite correct, and you should consider doing this even earlier when playing at higher difficulty levels. Monarchy has to be researched and "discovered" in order to be implemented. Once discovered, you will be notified of it with the following announcement:

> *You have just acquired the knowledge of MONARCHY. Under a MONARCHY your citizens are more productive but the maintenance costs of military units are higher. To change your government to a MONARCHY, you must first have a Revolution! (Revolution: see the GAME Menu).*

At this time, therefore, select REVOLUTION from the GAME menu and, after one to four turns of Anarchy, the option to go

either back to Despotism or forward to Monarchy will be presented. Choose Monarchy, of course.

Like all forms of governments in *Sid Meier's Civilization*, Monarchy has its strengths and weaknesses. On the down side, every unit built by a city (except Diplomats and Caravans) will be charged one resource per turn for maintenance. Looking at the City Display's Home City window will show all of that city's current liabilities. Notice that Settler units always ate a food unit each turn. Now they eat *two*, plus a shield, every turn. Naturally, this is a limiting factor in terms of having swarms of Settler units around as engineers busy improving the landscape.

The way to counter this problem is to have each city build its own Settler unit for local engineering projects (draining swamps, building roads, irrigating, mining, etc.). Irrigating the River, Grassland and Plains squares being worked by a city will dramatically improve the local food supply, getting the city back to growing despite the food drain caused by having the Settler unit being supported there. Mining nearby hills will help offset the new resource maintenance costs for every unit the city is supporting, too. Experiment with landscape improvements and develop an instinct for useful terrain improvements.

Civil Unrest

Those revolting peasants really take the cake!

— Marie Antoinette?

After a few citizens initially appear to populate a city, each additional new citizen that is added is unhappy. At the Chieftain level that the game is currently set at, the first six citizens in a city will be born content, and beginning with the seventh, each will be born unhappy. Thus, when the city size reaches seven, that seventh citizen is going to be a problem that must be dealt with.

Troubleshooting is detailed in Chapter 6, but for now, it is important to know that military units can suppress disorder, certain city improvements will assuage the malcontents, and

luxury items will make content people happy. Cities will only riot when there are more unhappy citizens than happy ones, so you can balance the happy and unhappy citizens to keep cities from seething with revolt. Again, the computer's advice on this subject is quite good:

A city falls into Civil Disorder when the number of unhappy citizens exceeds the number of happy citizens. Growth and production cease while a city is in disorder. Remedies for disorder include: turning citizens into entertainers, moving military units into the city, building a Temple, Cathedral, or Colosseum, increasing the amount of trade used for Luxuries.

There is one other, more long lasting trick to keep citizens happy. Chapter 8 cites certain wonders of the world that can awe the masses into contentment or even happiness. They're not cheap, but they're the "big fix" to many serious problems that must be solved.

Diplomacy and War

Well, it does make for spirited reading in the history books.
— Lord Gladstone?

Again, Chapter 6 will help with troubleshooting, and Chapter 7 details the military aspects of *Sid Meier's Civilization*, but the computer is right there with some sage (although basic) advice in its General Principles #2: "Make peace with your stronger neighbors. Crush and conquer your weaker neighbors. As your civilization grows don't forget to use your diplomats to learn what your opponents are up to."

Occasionally, when changing production in a city, your Military Advisor will chime in with, "We should build [Militia/Phalanx] to defend our cities." Better still, he will suggest, "We should build a [Legion/Cavalry/Catapult /Chariot] to attack our enemies."

Finally, the computer advisors might suggest, "We should build a Diplomat to make contact with other civilizations" or "We should build [a] Trireme to explore the world."

At this point, you should experiment. When contacting enemy

leaders, don't give away the store. Trading knowledge with them is usually a good idea, however. At the Chieftain difficulty level, they will always offer you a peace treaty. Stir the pot a little and start a war, just to see how it works. Send Diplomats out to establish embassies and bribe enemy units and cities. Build some caravans later and notice the increase in trade they bring the city that produces them when they move to another city.

Where Will Things Go From Here?

Forecasting is difficult, especially about the future.

— Nostradamus?

After a while, you will want to evolve into a higher form of government. Try to discover The Republic, then switch over to it, and learn to make it work for the long haul. If things are looking pretty peaceful, go for Democracy instead. These two representative governments will provide you with the best opportunities for economic expansion (although they are the worst for conducting wars), as explained in Chapter 4.

At some point, therefore, settle into The Republic or Democracy. Set your luxury rate at 20%, tax rate at 40% and let the remaining 40% go to scientific research. From there on, acquire new things and try them out for a game or two. Chapter 5 (with the Pyramids of Progress), Chapter 7 (with the military unit analysis) and Chapter 8 (with a close-up of each wonder of the world) will navigate you through the myriad of possibilities facing you in every game of *Sid Meier's Civilization*. Finally, Chapter 9 will explain what it's all about: winning.

Chapter 3

Reading the Map

In an early scene in the Archibald MacLeish play, *J.B.*, a friend asks J.B. (a modern version of the biblical figure Job) for the secret of his success. J.B. tells the fellow to look out the window and identify what he sees. When the friend tells him that he sees a road, J.B. states that he is right, but follows up with a question, "But where is it going?" Indeed, the story of history is as much a question of "where?" as it is a question of "what?" and "why?"

Since history occurs in space as well as time, it is impossible for the astute student of history to overlook the lessons to be learned from geography. Indeed, many historians assert that if they are shown a map of a region, they can write its history. This is because, as British geographer W. Gordon East observed in his *The Geography Behind History*, climate and soil limits the varieties of vegetation available for a population's diet; topographical features determine the possibilities/probabilities of travel, trade and migration; natural resources form the basis of primitive economies; and natural boundaries (oceans, mountains, deserts, marshes and forests) bisect regions from one another and form the seminal basis of tribalization and nationalization.

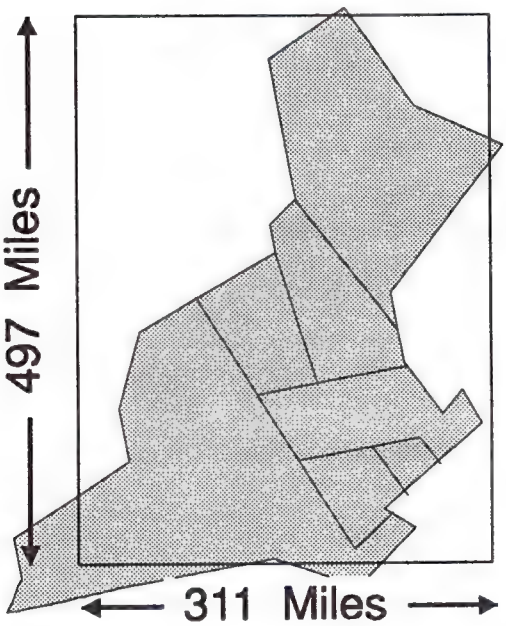
What this should tell the player of *Sid Meier's Civilization* is that it pays to understand the map and use the terrain to your advantage. Understanding the terrain features in the game can allow you to place your cities in more desirable locations, build stronger economies, create more defensible positions and launch more efficient military campaigns. Further, what you *don't* know about the map *can* hurt. This chapter is designed to explain the effect of each terrain type on a potential civilization's movement (travel, trade and migration), defensive capacity and economic viability.

Map Legends

See, I told you I'd find India!

— Christopher Columbus?

First, you need to know that, no matter whether you choose a custom world, random world or the earth itself, the global map is 50 "squares" high and 80 "squares" wide. Note that the map always has a polar region at both the top and bottom of the map and that it is always possible to exit the map horizontally on one side of the screen and enter from the exact opposite side.



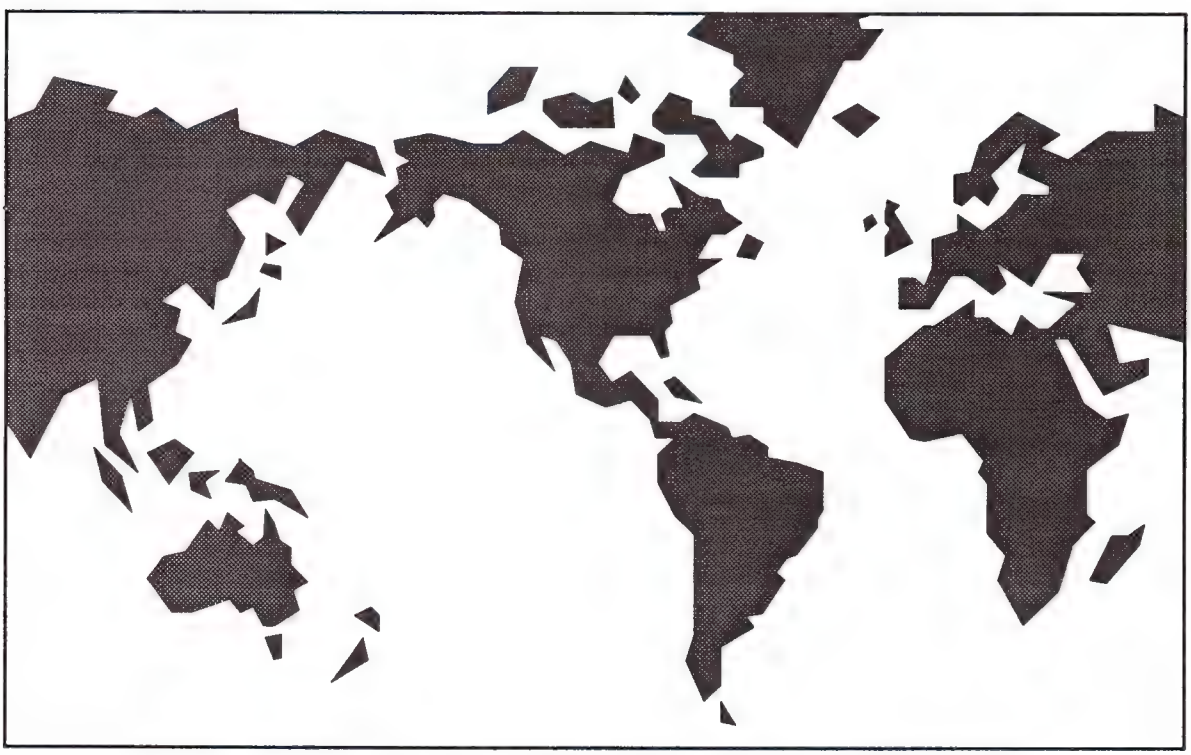
Hence, you can think of the game's map as being a Mercator Projection of the game world. In rough earth equivalents, this would mean that each square would represent approximately 311 miles in width (adding up to the equatorial circumference of 24,902) and circa 497 miles in height (totalling up to the polar meridien's circumference of 24,860). Since the so-called "squares" are, for esthetic reasons, more like a millimeter by a millimeter and a half (rather than the expected, but elongated, one by two) as displayed on the average computer screen, the game does not offer you a "true" scale. Nevertheless, it may be helpful to imagine each square as containing approximately the area of New England and New York state.

One should also know that pressing the **T** key will cause all the units on the board to be temporarily toggled off so that the terrain types can be viewed without distraction. After you note the various terrain types, the units can be toggled back on in order to make your moves.

Those who want to know more about the effects of various terrain types should take advantage of the on-line information available under the Customize World menu option, examine Table 3-1 (Comprehensive Terrain Effects) and read the

various summaries of individual terrain types. Some of the on-line help was not documented in the first edition of the manual. Basic information is available for mouse users by positioning the cursor over any terrain square and pressing the right mouse button. More detailed information is easily accessible using the **ALT-H** hot key and the Customize World option. Such an action will "create" a custom world, but it is useful for learning the consequences of certain choices. There are four basic decisions to be made. You choose the amount of land mass, average temperature, average rainfall and the planetary age. By highlighting the decision and pressing **ALT-H**, the program indicates the differences to be found under each category.

On a more detailed level, the Comprehensive Terrain Effects table displayed on the following page is designed to provide "at a glance" assistance and each individual summary is designed to place the information in both historical and game perspective. If you prefer on-screen help you can simply place the cursor over the terrain square in question and press **ALT-H** (or the right mouse button).



Mercator Projection of the Earth

Table 3-1. Comprehensive Terrain Effects

Terrain Types	Move Cost	Defense Bonus	Food/ Irr.	Shields/ Mine	Arrows/ Roads	Converts To	Related Disaster	Hydro Power?
Arctic	2							
Seals	2		2					
Desert	1		0/1	1/2	0/1+			
Oasis	1		3/4-	1/2	0/1+			
Forest	2	+50%	1	2		Plains		
F-Game	2	+50%	3-	2		Horses		
Grassland	1		2/3-	0 or 1	0/1+	Forest		
Hills	2	+100%	1/2	3-			Earthquake	No
Coal	2	+100%	1/2	2/5-			Earthquake	No
Jungle	2	+50%	1			Grassland/Forest		
Gems	2	+50%	1		4+-	Grassland/F-Game		
Mountains	3	+200%		1/2			Volcano	Yes
Gold	3	+200%		1/2	6+-		Volcano	Yes
Ocean	1		1		2+		Pirates	No
Fish	1		3-		2+		Pirates	No
Plains	1		1/2	1	0/1+	Forest		
Horses	1		1/2	3	0/1+	F-Game		
River	1	+50%	2/3-	0 or 1	1+		Flood	Yes
Swamp	2	+50%	1			Grassland/Forest		
Oil	2	+50%	1	4		Grassland/F-Game		
Tundra	1		1					
T-Game	1		3-					

+ = When a number is followed by a plus sign increase that number by one under the representative governments of Republic and Democracy.

- = When a number is followed by a minus sign decrease that number by one under Despotism and Anarchy.

F-Game and T-Game represent Forest Game and Tundra Game respectively.

Note 1: Railroads increase production by one where a space already produces two of something after other modifications. Thus, a railroad improvement in a mined Gold square under a representative government would produce 0 food, 3 shields (1 + 1 for the mining + 1 for the railroad) and 10 arrows (6 + 1 for the government type + 3 for the railroad).

Note 2: Pollution halves the total of all production in a square, rounded up. A square producing 3 food, 1 resource and 2 trade, if polluted, produces 2 food, 1 resource and 1 trade.

Arctic Terrain and Tundra

But baby it's cold outside!

— Eric the Red?

Arctic squares are, by definition, inhospitable. Movement is moderately slow and there are no built-in natural resources,

save the seals (which can, of course, be harvested in order to provide two food production units). This corresponds to reality in that even as hardy a stock as the Vikings who settled Greenland were reduced to a population of undersized and deformed individuals by circa A.D. 1500. The early settlers (i.e. those who had bought into Eric the Red's "advertising" campaign that preached the virtues of this barren continent as being, indeed, a *Green*land) watched the pastureland, originally available in protected valleys and alongside fjords, shrink further and further toward the southern coastlines. Apparently, as conditions worsened, the Eskimos who hunted the seals (represented in the game by the seal squares) began to attack the Viking settlements and the, heretofore, stocky group of colonists could not resist the attacks.

This leads to an important fact about the game. Arctic territory breeds barbarians. The French philosopher, de Montesquieu, observed in *The Spirit of Laws* that, by the 18th century, Asia had been conquered thirteen times. By his count, eleven of those thirteen conquerors came from the less hospitable northern climates. He suggested that the cold of Siberia created the conquering Tartars and attributed a quote to Jornandes the Goth as stating that the north of Europe was the "forge of the human race."

Following the historical model, barbarian incursions are formulated from a base of unsettled Arctic squares. So, players who wish to cut down on the nuisance attacks arising from barbarian incursions may want to establish a minimum of one settlement in each polar region.

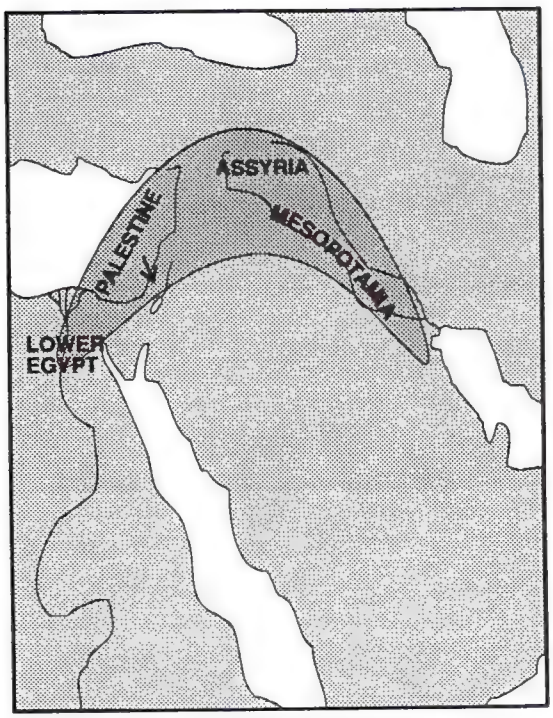
Related to arctic squares are their near cousin, the Tundra squares. As you will notice by looking at the Comprehensive Terrain Effects table, these squares are only slightly more hospitable than the Arctic squares.

Deserts

I've always wanted a sandbox!

— T. E. Lawrence?

Western civilization owes much of its stability to the Judaic



The Fertile Crescent

and Christian heritage that has its roots in the Ancient Near East. This area can be defined, as Sabatino Moscati did in his *The Face of the Ancient Orient*, as having the Arabian Desert as its nucleus with the so-called "Fertile Crescent" (the Egyptian, Mesopotamian and Syro-Phoenician valleys) surrounding it in a great arc. Tribes and civilizations generally settled in the river valleys, but continually traversed the wastes of these deserts. Some nomadic tribes even forged a marginal existence from oasis to oasis.

Sid Meier's Civilization reflects the marginal possibilities of the great deserts of the world by allowing subsistence development in the Desert squares themselves and exceptional results from the Oasis squares. As in reality, a civilization can squeeze out some production through irrigation and recover some valuable minerals through mining. If a leader is willing to assign a Settler unit to a given area of desert for five turns (see the Terrain Time Management chart), the square will produce one food unit per turn. This is more than the non-productive arctic regions, but considerably less than the three units produced by irrigated grasslands and the potential four units to be harvested in irrigated oases. (See Table 3-1, Comprehensive Terrain Effects.)

Needless to say, since the desert areas do not produce any food units *without* irrigation, these squares are *not* good initial locations for cities. This is certainly as it should be, however, since there is a theory of economic/social development called the "hydraulic hypothesis." This theory suggests that it was precisely the necessity of irrigating arid fields that created strong central governments (for planning and constructing canals and dykes, regulating water use, maintaining the system and defending the system from alien raiders) and allowed enough productivity for economic specialization to

occur (Karl Wittfogel, *Oriental Despotism: A Comparative Study of Total Power*).

The desert is somewhat kinder in terms of her mineral riches, however. The game reflects this fact by allowing leaders to assign settlers to mine either a Desert or Oasis square for five turns and receive two shield units (representing raw materials, ore for manufacturing, and some oil). This is, of course, superior to the mineral deposits to be found in Grasslands or on Plains, but inferior to Hill squares and known coal deposits (identified by their own symbol on the map).

Finally, there is the matter of defense. At first glance, it seems that desert territories would form an adequate buffer against hostile tribes and armies. Historically, however, that has not been the case. Those armies which wished to traverse the expanses always seemed to manage to move from oasis to oasis and those nomads who lived within the desert's hostile expanse would often make forays/raids upon developing civilizations on the fringes of the desert. Hence, there is no defensive bonus for either Desert or Oasis squares and they are quite easy to traverse. The movement cost is merely one point in the case of either terrain and it is inexpensive to build roads and cut the costs down further (to 1/3 movement point per square). In fact, you need only assign a Settler unit to either square for two turns in order to construct a road or for four turns in order to construct a railroad (when the civilization has the required technology). Naturally, the presence of a road will add at least one arrow per turn due to increased trade potential, and the construction of a railroad will precipitate the advantages described in Note 1 of Table 3-1, "Comprehensive Terrain Effects".

Forests

I'm thinking of branching out.

— Robin of Locksley?

Forests are an incredible natural (and renewable) resource. They provide building materials for shelter and furnish firewood for warmth and cooking and an environment where game is likely to be found, as well as potential concealment

from one's enemies. In *Sid Meier's Civilization*, forest terrain is just as valuable. Even *without* irrigation, the terrain provides one food unit and two shield units (building materials) per turn. This reflects the fact that prior to the development of metal plows (both the early footplows and the later, animal-drawn traction plow), primitive laborers needed to work the plots of ground where the tree cover prevented a heavy (and difficult to uproot) undergrowth. Forested plots, particularly around tree trunks and stumps, offered potentially easier plots to prepare for planting than the grasslands.

Further, just as legendary bandits such as the Robin Hood of British ballads and Lin Chong of the Chinese tradition's Lian Shan Bo mountain were able to use their respective forests to hide from, survive the attacks of and ambush their enemies, the game offers a 50% defense bonus for military units which are attacked in Forest squares.

Forest squares have no mineral value, so they cannot be mined by Settler units. They can be irrigated, but the process of building canals will cause the terrain to become a deforested plain (in five turns) prior to becoming useful farmland (after *another* five turns).

If you are fortunate enough to be able to build a city near a Forest square with an animal icon pictured thereon, you should never have to worry about developing that square. To reflect the good hunting (whether it be the "King's deer" or wild rabbits), the game offers three food units per turn for Forest-Game squares and still allows two shield units per turn to represent harvesting the raw materials.

One disadvantage of Forest and Forest-Game squares is the fact that it requires two movement points per turn for units to move through this terrain. Therefore, it is extremely efficient to build roads and, later, railroads through these squares. Once built, the movement cost is strictly that of road movement (1/3 movement point), but to reflect the time required to remove trees and make room for roads and/or rails, it requires *four* turns to build regular roads and *eight* turns to build railroads (as opposed to the two and four turns,

respectively, for Desert, Grassland, Tundra, Plains and River squares).

Grasslands

It's good to touch the green, green grass of home.
— Richard the Lion-Hearted?

Grassland is the basic terrain to be found in the game. It offers no problem for movement (costing only one movement point per turn to traverse it and only requiring two turns to build a road over it or four turns to construct rail lines across it), no defensive bonus and, often, no significant resources other than its potential to be developed into productive farmland. The program *does* perform a random function to determine if grassland has any natural resources. There is a 50% chance that a Grassland square will contain one shield unit per turn.

Historically, once primitive farmers could harness their metal plows to domesticated animals, cultivating and planting grasslands became more efficient than cultivating forest plots. No longer did as many trees have to be chopped down and stumps removed in order to create large unobstructed fields, but the accessible sunlight allowed crops to yield more. Hence, unimproved Grassland squares yield two food units, but irrigated Grassland squares yield (normally) three food units. It requires five turns for a Settler unit to construct the irrigation canals in a Grassland square.

Remember the "hydraulic hypothesis" mentioned earlier in this chapter? Sid Meier apparently recognizes some of the validity of this concept, since the game *subtracts* one food unit from Grassland (and River) square production if a civilization has not at least reached monarchy on the scale of advancing governmental structures.

Grassland squares may also be mined, but the result is that the square is reforested rather than producing minerals. It takes ten turns to mine a Grassland square and transform it into a Forest square.

Hills

The hills are alive.

— Macbeth?

Hills and slopes play a vital role in many geographical areas. Many ancient cities were built upon hills in order to increase their defensive potential, whether those cities be located in Asia, Japan, Central America, Palestine or Europe. Not only did cities which were located on hills have the advantage of high ground over any would-be attackers, but they also had the intelligence advantage of being able to more fully visualize the deployment of the enemy. The defensive value of Hill squares is duly noted in *Sid Meier's Civilization*. The game design offers a 100% defensive bonus to units which are attacked in such squares.

Many people would be amazed at another important role that hills and slopes played in ancient history. Although it does not seem logical, at first this type of terrain had a significant stake in the agricultural development of many regions. Where rainfall and river/stream flow was less than desirable, laborers would build terraces along hillside slopes to contain the meager amount of annual rainfall within the soil that would otherwise have flowed downhill. Thousands of years before Christ, many hillsides in Palestine, where the Jordan river was not as prolific as the Tigris and Euphrates of Mesopotamia or the Nile of Egypt, were converted to olive groves and vineyards that could survive on terraced levels. Hundreds of years before Christ, the hillsides in the vicinity of Athens were terraced into olive groves and vineyards and, an ocean away in MesoAmerica, there is evidence that the Mayans had also learned the lessons of terraced hillsides.

The game reflects the ability of dedicated laborers to urge a harvest out of less than optimal terrain by allowing you to "irrigate" (or, more realistically, to terrace) Hill squares and glean two food units from them. It will take ten turns for a Settler unit to "terrace" the hillsides by using the "irrigate" command.

Another advantageous feature of Hill squares is their capacity

to contain coal. Coal is represented on the map by the black mineral icons. It will take a Settler unit ten turns to establish a coal mine. After this is completed, the square will net five shield units per turn (if the civilization which controls the mine is beyond the two lowest forms of government: anarchy and despotism).

Do not expect to find an Appalachian-type region where layers of coal lie back-to-back. The program's algorithm for special resource squares (Coal, Game, Gems, Gold, etc.) ensures that these squares will *never* be within two squares of each other. As the world is created, the program designates a patchwork quilt of resource squares such that they end up in diagonal patterns all the way across the map. For those who are interested, the pattern is easily observable when viewing the Fish squares in a large section of ocean.

For other improvements on Hill squares (mining, road and railroad construction and fortress building), see the Terrain Time Management chart.

Table 3-2. Terrain Time Management

Terrain Type	Road	Rail	"I"	"M"	Fortress	Pollution
Arctic	4	8			6	4
Desert/Oasis	2	4	5	5	5	4
Forest/F-Game	4	8	5	5	6	4
Grassland	2	4	5	10	5	4
Hill/Coal	4	8	10	10	6	4
Jungle/Gems	4	8	15	15	6	4
Mountain/Gold	6	12		10	7	4
Plain/Horses	2	4	5	15	5	4
River	2	4	5		5	4
Swamp/Oil	4	8	15	15	6	4

Represented is the number of turns it takes the Settler unit to perform that function.

Jungles

I have an unerring sense of direction.

— David Livingston?

Ironically, the Sanskrit word *jangala* from which we get the English word, "jungle," means desert. Later, it came to mean

scrub or bush. Either translation is a far cry from today's definition of jungle as a geographical area which is filled with verdant, tangled and often almost impenetrable vegetation. On earth, the majority of jungles and tropical rainforests are found in the region between the Tropic of Cancer and the Tropic of Capricorn. Logically enough, this is because of the need for plentiful rainfall in order for such biomes to exist.

In *Sid Meier's Civilization*, Jungle squares can appear almost anywhere on any continent (except for the polar regions). In addition to this questionable model, travel through a Jungle square only costs two movement points (equal to the more easily traversible, in real life, hills and forests). A more severe cost for movement would be expected. Fortunately, the costs for irrigation and mining projects are proportionately more appropriate to the perceived differences between Jungle squares and other types of terrain. See Table 3-2 for further details.

Jungle squares are advantageous in the game because they are the repository of Gem resource squares. Gem squares, in turn, greatly enhance a civilization's trading potential. In addition, both Jungle and Gem squares offer a 50% defense bonus, presumably because of the line of sight problems to be found within jungle environs.

Mountains

Give me men to match my mountains.

— Mae West?

Mountains serve a foundational purpose in the spiritual life of most primitive civilizations. Thrusting skyward from the mundane ground level of the earth, these "sacred" places seemed to simultaneously direct early civilizations' thoughts toward a, literally, higher plane and offer a nexus point where sacred and profane could meet. The fact that many mountains were associated with volcanic activity would do little to dissuade primitive man from believing that there was something sacred about these pinnacles.

Where there were no mountains (such as the flood plains of

Egypt, the river valleys of Mesopotamia and the jungles of Central America), the people built artificial mountains (ziggurats and pyramids). The spiritual purpose to be found in these artificial mountains is expressly noted in Genesis 11. The people wanted to climb higher so that they could reach God. (For further reading on this subject, the authors recommend the chapter on "The Awe of Mountains" in Daniel J. Boorstin's *The Discoverers*.)

The mountains in *Sid Meier's Civilization* serve no spiritual purpose. Although a civilization can build temples and cathedrals (which serve as wonders) within the boundaries of a city, there is no bonus for building shrines, oracles or stupas upon the mountains.

In the game, the only certain value of a Mountain square is that it adds a 200% bonus to a military unit's defensive value. Mountain squares *can* serve as a source of mineral resources, two shield units per turn if you invest the ten turns required to mine the square, and are the only terrain type where gold can be found (six trade units per turn).

As noted in the game's manual, Mountain squares cannot be irrigated and do not provide enough food resources to make them a viable location for a city. They can be used as a buffer against enemies, however, since the movement cost of three points will slow the enemy down and give defense forces an opportunity to respond to impending attacks.

Oceans

Round, round, round, round, I get around.
— Christopher Columbus?

Since only ships and aircraft can enter Ocean squares, it is obvious that it is not possible to locate a city therein. Further, unless a Fish resource square is next to a coastal city (yielding three food units per turn), there is no way to exploit the random placement of fish resources. Ocean squares do reflect important trade routes, however, so coastal cities can obtain a dividend of two trade units per turn from them.

Plains

The plains, the plains!

— Buffalo Bill?

In the game, the Plains squares seem to represent two actual terrain types: the Eurasian steppes and the North American plains. This is accurate because there are cultural similarities between both regions, even though there are some differences in terms of vegetation and overall climate. The similarities in the social structures of both plains and steppe civilizations are: nomadic existence with reliance upon horses (hence, the Horse resource squares to be found in these squares within the game context), emphasis upon hunting rather than agriculture and reputation for engendering fierce warriors that threatened more advanced civilizations.

Most any American child is well aware of the legendary Native American attacks upon wagon trains and frontier outposts of western civilization, but how many are aware of the Hsiung-nu, the invading horsemen from the steppes who overran the northern provinces of China and brought about the downfall of Wang Mang (the last strong Han emperor)? Both warrior peoples joined together in loose confederations of tribes under charismatic chiefs when it was necessary to defend their pasturelands or make an incursion into more fertile lands in order to survive.

A major reason for the warlike nature of theses tribes was the fact that they had almost no geographical/territorial barriers to protect themselves from anyone who would try to steal their pastureland or watering holes. In the game, this vulnerability is reflected in the fact that the squares cost the minimal amount of movement (one point) and offer no defensive bonus of any kind. Because they can reap minimal output when irrigated, it is possible to found a city upon plains squares, but unless there are Horse resource squares nearby, there *are* better sites.

Swamps

Swamp thing, you make my heart sing.

— Francis Marion?

Swamp squares represent swamps (wetlands with standing water and trees as their primary vegetation), marshes (wetlands with standing water and grasses as their primary vegetation) and bogs (areas which *look* dry at first glance but have enough water coverage to saturate those who walk through them). So, one obvious consequence for game play is the fact that the presence of water and attendant mud in Swamp squares slows down the traveller (costing two movement points in game turns).

A less realistic aspect of the game model is the fact that Swamp squares are the source of "oil" resources. While oil *may* be found in some wetlands, these terrain types are more often noted for peat, coal (mineralized peat) and salt. Such resources would have been more realistic, but wise gamers will simply smile and move onward to mine the Oil resource squares. See the Terrain Time Management table for further information on developing these squares.

Another game aspect related to Swamp squares brings to mind some anecdotes from the Revolutionary War in the southern portion of the United States. In the game, Swamp squares receive a 50% bonus, reminding U.S. history buffs of Brigadier General Francis Marion's favorite tactic of retreating before the enemy and luring him into heavily forested swamp areas where said enemy could be cut into ribbons (Blue Savannah) or where the so-called Swamp Fox's guerrilla band could disappear to survive another day (Ox Swamp).

Another tactic utilized by Marion was to surround an enemy on three sides, using the cover of a swamp, and rout said enemy through the "golden bridge of retreat" (so named by Roman General Scipio Africanus). This was the tactic used at both Black Mingo Swamp and Tearcoat Swamp (both in the Fall of 1780). Swamp squares offer no offensive bonus to military units in the game, however.

Rivers

Be sure they get my good side.
— George Washington crossing the Delaware?

If the first shall be last, it is appropriate to discuss River squares at this point in the chapter. Any discussion of the place of river valleys in the formation of early civilizations seems almost too rudimentary for any reader who has reached this point in the chapter. Whether the river was the Euphrates, Nile, Indus or Yangtze, it provided a ready source of water, viable form of transportation (i.e. trade) and fertile agricultural basin.

It goes, then, almost without saying that the low movement cost, 50% defense bonus (reflecting the necessity of your enemy crossing the river under fire), lavish production of food units when irrigated (assuming you have developed to the sophistication assumed in the "hydraulic hypothesis" discussed earlier), immediate trade potential and eventual capacity for hydroelectric power (both clean and efficient) make each River square a natural choice for the placement of a civilization's initial or any other city.

Interestingly, like Grasslands, River squares have a 50% chance of generating a resource unit each turn. Unfortunately (and *unlike* Grassland squares), there is no visible way to determine which River squares will generate a resource by examining the map. Building a city on a River square is like swallowing an unmarked pill; you won't know the effect until after it's been done. Once a city is built near a river, it is a good idea to move the workers around on the City Display to find out which River squares produce resources. This will be discussed in more detail in Chapter 4.

Exploiting Terrain

Double your pleasure.
— The Corsican Brothers?

Much of the value of this chapter depends on the reader recognizing the value of each terrain type and exploiting that

terrain to the fullest. This section suggests a clever way to get maximum efficiency out of said exploitation. We call it the "Double Your Pleasure" technique.

This technique recognizes that two Settler units can work the *same* undeveloped square of land at the same time. You can change the landscape (drain the swamp, irrigate, etc. using the **I** or **M** commands) while, simultaneously, another can be constructing roads or railroads therein. Thus, later in the game when your government is either The Republic or Democracy and every city has its own personal Settler unit working the land within the proximity of the city, it might be a good idea to make the stretch and have them work in tandem on a single space at a time. This technique creates the fastest optimization of each square possible and increases city values with ruthless efficiency. It is particularly useful for helping cities newly built in the latter stages of the game to get off to a quick start and grow as rapidly as possible.

Another important element you must bear in mind is the value of special squares (Game, Gems, Oil, etc.). The manual indicates that converting these special terrain squares might penalize a player with the loss of the special attribute. This is not exactly the case. As correctly stated on the Comprehensive Terrain Effects table in this chapter, Forest-Game squares irrigate nicely into Plains with horses and so on. The only loss occurs when converting Gem and Oil squares into Grasslands. This is only because there is no special terrain type which exists within Grassland squares for gems and oil to convert into.

Summary

I can read you like a map.

— Marco Polo?

The reader of this chapter should have learned about the basic makeup of the worlds to be conquered in *Sid Meier's Civilization* and the advantages to be gleaned from each terrain type. The chapter was designed to reveal some time management constraints that are not documented in the game manual; to illustrate some of the historical lessons to be

learned from the game and to share the "Double Your Pleasure" technique of developing/exploiting natural resources.

Chapter 4

Planning the Itinerary

Building Blocks for City Managers

Experienced travelers have a pithy way of belittling the standard European tour. They call them "ABC Tours" and the ABC can be an acronym for: another blasted cathedral, another bourgeois capitol, another boring cemetery *or* in random sequence, all of the above. Time travellers who are encountering history through *Sid Meier's Civilization* should recognize that the ABCs of religion, government and population do not merely provide the enduring landmarks of civilizations which figure prominently in guided tours, but they provide the building blocks for, essentially, every civilization.

This chapter will overlap slightly with other chapters, but will center upon managing cities as the foundation of empire. As Fernand Braudel observed in *The Structures of Everyday Life*, "All major bursts of growth are expressed by an urban explosion". This chapter should help gamers assemble the right ingredients for such an explosion.

Taxation

Frankly, I'm not so sure it's great with *representation, either.*
— Patrick Henry?

Just as capitol buildings are not simply constructed to be tourist sites, the revenue mechanism known as taxation was not simply established to oppress the general population. Capitol buildings, of course, represent the political center of a centralized government and taxation represents the power of that centralized government to generate enough revenue to: maintain law and order; provide for national defense; construct such public works projects as are deemed appropriate *and*, in the case of a more enlightened hierarchy, support the health, education and welfare of its citizenry.

In history, taxes have had a haphazard existence. The earliest taxes appear to have been presented to the clerisy (see the section on religion in this chapter) as appeasement to the gods/spirits or to the generals, governors and kings as tribute. The method of taxation varied from levies on particular goods or tracts of land to head taxes (an annual fee placed upon the head of every male citizen). Such taxation tended to be both complicated (creating incredible bureaucracies such as those in Ptolemaic Egypt) and regressive (providing unequal burdens between citizens, since the same amount was placed on each head or each commodity/field/enterprise).

Sid Meier's Civilization is kind to its players, since it has simplified the entire history of taxation into a percentage-based assessment against gross domestic product. Such a system of national assessment arrived very late within the history of western civilization. In the 11th century, William the Conqueror introduced a "geld" or tax which was levied against the entire population. This has often been identified as the first system of national taxation known to Western Europe.

Seal of William the Conqueror
The Spiritual Father of
National Taxation

In the United States, such a system did not occur until World War I. Paul Samuelson, a Nobel Prize winning economist, observed in his landmark textbook (*Economics*) that *local* government was more important than either state or federal government prior to the first world war. National defense, pensions for the aged and disabled and debt retirement on past wars were funded by excise taxes on liquor and tobacco, as well as tariff duties on imports. Further, states subsisted on sales taxes and local governments depended primarily on property taxes.

Since the system of imperial/national taxation is available to you from the start, however, it is exceptionally wise to *use* the system from the very beginning of the game. Alert readers observed in the tutorial that the tax rate is set for 50% (of gross domestic product) from the start. They will also have noted that this means that only half of the funds potentially available

for scientific/technological advancement are accessible to the civilization's research and development community.

Supply-Side Economics

These high taxes make me see red.

— Karl Marx?

To maximize a civilization's potential for scientific and technological advancement, the authors recommend the following exercise in supply-side economics. Immediately after founding a civilization's initial city, pull down the Game Menu and select Tax Rate. Reduce the tax rate from its default 50% to 10% (90% Science). This reduced rate will allow the civilization to continue to maintain its current rate of expenditure while *increasing* the rate at which scientific advancements occur. These advancements, in turn, will accelerate the wealth and well-being of the civilization as a whole.

In this way, the game mechanics mirror life. The theory behind tax reduction as a spur to economic growth is built on two principles: the multiplier and the accelerator. The multiplier effect is abstracted out of *Sid Meier's Civilization* because it is a function of consumer spending.

The multiplier effect says that each tax dollar cut from a consumer's tax burden and actually spent on consumer goods will net an additional fifty cents at a second stage of consumer spending, an additional twenty-five cents at a third stage, an additional twelve and a half cents at a fourth stage and so on. Hence, economists claim that the full progression nets a total of two dollars for each extra consumer dollar spent as a result of a tax cut. A more detailed analysis of this phenomenon may be found in "The Economic Theory Behind the Tax Cut" in *Economic Issues and Policies: Readings in Introductory Economics* by Arthur L. Grey, Jr. and John E. Elliott.

The multiplier effect cannot be observed in the game because it is only presented indirectly. Additional consumer spending causes a flash point where additional investment takes place to increase, streamline and advance production capacity and inventory to meet the demands of the increased consumption.

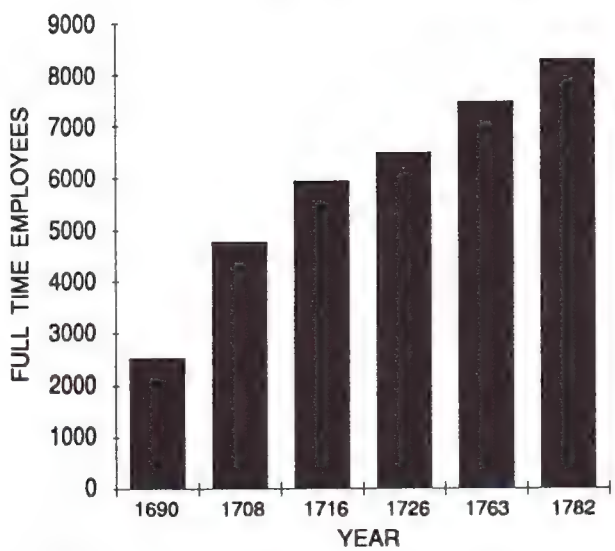
Production increases and advances, in turn, have an additional multiplier effect *beyond* the initial consumer spending. When the scientific advancements occur more rapidly in *Sid Meier's Civilization*, they reflect that flash point of additional investment and allow civilizations to prosper at an ever-accelerating rate.

Tax Collectors

I never met a tax collector I liked.

— Will Rogers?

Naturally, there is a limit to what supply-side economics can accomplish. If the tax base is not large enough to support the maintenance of public operations and obligations (i.e. national debt), there is a decelerator effect on the economy. Since *Sid Meier's Civilization* demands a balanced budget for each civilization, frustrated rulers are often faced with several unpopular choices: raise taxes, disband military units, sell public works or appoint tax collectors. The choice between these unpopular options will usually be made when you are given a warning from the domestic advisor stating, "Funds are running low. Perhaps we should raise our tax rate or hire some tax collectors." It is usually *easiest* to raise the tax rate, but more *efficient* to hire the tax collectors.



Growth in Full-Time Fiscal Employees in England

The game mechanics regarding the collection of taxes can certainly be defended from a historical perspective. The British historian, John Brewer, observed in *The Sinews of Power: War, Money and the English State, 1688-1783* that the effectiveness of British tax collection during the 18th century was due to a move from a heterogeneous system with four levels of administration (constables and sheriffs, employees of tax farmers, parliamentary commissioners and royal officials) to a unified bureaucracy of trained professionals. The growth in full-time employees within the fiscal bureaucracy of England

from 1690-1782 should effectively illustrate the revolution in tax collection which occurred in a relatively short era.

That such a growth in fiscal bureaucracy was beneficial to the English state is reflected in Simon Schama's remarks in *Citizens: A Chronicle of the French Revolution* about the period prior to the French Revolution. He stated that the major difference between the power of the British and French governments following the Austrian and Seven Years' wars was that "William Pitt could raise revenue from new taxes without threatening a major political crisis" and that the French ministers could not do so.

In order to use the English model of taxation, you will need to access the City Display for any of your cities with moderate to large populations. In such cities where there is sufficient food surplus to maintain the city's population for several turns in the future (see Chapter 2 concerning the Food Storage Box), you will want to access the City Map and take the least productive square which *is* already in production *out* of production (see "Sitting at the Mayor's Desk" in Chapter 2 for instructions if you do not already know how to accomplish this task). As readers of Chapter 2 already know, this will change one of the worker icons in the Population Roster into an entertainer icon. Now, mouse users can click on an "Elvis" and turn him into a tax collector and keyboard users can hit buttons **1-8** to change the icons in their fiscal bureaucracy to the corresponding number on the keyboard. Note, however, that you can never create a tax collector until the division of labor is such that, at least, one "Elvis" is present in the roster. Then, the "Elvis" can be transformed into a bureaucrat.

Usually, following the English model and creating additional tax collectors will enable you to increase the efficiency of revenue collection enough to stave off the inevitable tax increases until a later point in the game.

Note: The maximum amount of monetary units allowed in the civilization's treasury is 32,000 coins. That is the limit of the game's capacity to hold money in one player's account, so any efficient player who goes over that amount would lose those

funds. Like having 32,000+ coins in the treasury is a common occurrence!

Playing Tip: As you will note from the Elite Citizen Efficiency table, elite citizens not only immediately generate two of their specialty units [diamonds for the "Elvii," lightbulbs for the "Einsteins" and coins for the "Levi" (tax collector)] for an unimproved city, but they also benefit from the improvement bonuses.

Table 4-1. Elite Citizen Efficiency

Name	Basic	Marketplace	Bank	Library	University
Elvii	2	3	4	n/a	n/a
Levi	2	3	4	n/a	n/a
Einsteins	2	n/a	n/a	3	4

Note: Numbers equal units produced.
n/a = not applicable

Public Works

If you build it, they will run.

— Andre' Maginot?

Improving your cities is a major portion of the game. This section of the chapter is designed to offer some tips about prioritizing public buildings and how to get maximum value out of them. Which public works project needs to be constructed first will depend on the particular game considerations. In the initial city, after its Garrison is built, it is advisable to build a barracks before any other city improvements. On a continent populated by other civilizations, this might be immediately followed by the construction of City Walls to enhance defense. On a continent where your civilization is, initially, the only civilization present, it becomes more important to get the Granary built in order to spur population growth. Later in the game, your choice of public works should be predicated upon a given city's particular needs (i.e. whether you are trying to reduce discontent, fortify against an enemy, build up income, create more luxuries or increase your tax base).

Barracks

The Navy gets the gravy and the Army gets latrines.
— Horatio Nelson?

As noted in the tutorial, it is a good idea to build, at least, two military units to defend your initial city. It is an excellent idea to follow up that action by building a Barracks (40 shield units to construct and zero to two coins per turn to maintain) to enhance both the offensive and defensive capacities of subsequently built units. As noted in the documentation, their attack/defense factors will be increased by 50%. Presumably, the increase in military capability reflects two important factors: morale and training.

Morale is enhanced, as British historian F.E. Adcock observed in his *The Roman Art of War Under the Republic*, "a sense of comfort and security when not fighting is most important for the *morale* of the troops." The historian was speaking about the value for the army of the Roman Republic of knowing that they had a place to retreat to. He affirmed his position by noting that the Field Regulations of England, France, Germany and Russia all have a common sentiment: "the worst billet is better than the best bivouac." That is, the worst permanent quarters are better than the best temporary ones.

Training is improved because of the proximity of veteran warriors to inexperienced ones. The Romans formalized the support structure of lesser troops by placing the most experienced veterans in the *third* line (i.e. between the front line troops and the camp) as a means of discouraging premature retreat. More modern armies have formalized the structure through the creation of non-commissioned officers who have come up through the ranks and serve to provide both training and in-the-field command for less experienced troops.

Playing Tip: Note that Barracks become obsolete immediately after two particular scientific discoveries: Gunpowder and Combustion. There does not seem to be any logical reason for getting stuck with an obsolete Barracks, however. So, as soon as your civilization begins trying to develop Gunpowder or to discover Combustion, it is a good idea to sell the Barracks (to

Uncle Sid's Army Surplus?). With a mouse, simply open the City Display, click on the barracks icon and select from the menu options. With the keyboard, open the display and press the S key before selecting from the menu options.

City Walls

By the time they know it isn't a parade, it's too late.
— Joshua at Jericho?

Until the latter portion of the medieval period, city walls were a constant factor in the defense of ancient cities. In the Ancient Near East, advancements in weaponry caused a technological shift in the way city walls were constructed. As early as 3000 B.C., cities were fortified with ordinary stone walls. By 2000 B.C., walls were constructed more elaborately with casemate walls (two parallel walls with either open space or rubble in the space between them) or walls fortified with plaster (limiting the effectiveness of battering rams) and surrounded by a fosse (moat).

Fortified cities are, indeed, a common phenomenon nearly all over the world until roughly the 18th century. The most notable exceptions would probably be London, Venice and the cities of Japan where access by water reduced the effectiveness of defensive walls and the Osmanli Empire where the stability of the *pax turcica* prompted only the frontier cities to retain their fortifications.

Braudel noted in his *The Structures of Everyday Life* that western towns faced severe problems from the 15th century until the modern era. Artillery, he stated, had made the ancient walls useless, so they had to be replaced by wide ramparts which were submerged in the ground to provide support and "extended by bastions, terrepleins, 'cavaliers,' where loose soil reduced possible damage from bullets." This meant that the walls could no longer be moved outward with the inevitable increases in population. Instead, towns which once grew horizontally would now grow vertically.

Within the context of the game, City Walls provide two important functions: protecting against flood damage and

enhancing defense. The former is automatic. The latter is due to the fact that City Walls *triple* the defensive strength of units within the city. This is true until such time as artillery and bomber units are able to lob incoming ordnance directly into the city without penetrating or reducing the walls. Just as importantly, cities which are defended by City Walls do not have their population reduced when defending units are destroyed. This final point enables players to use the following stratagem. City Walls require Masonry skill, cost 120 shields (production units) to construct and two coins (monetary units) per turn to maintain.

Playing Tip: On occasion, it will be advantageous for a player who is technologically behind an enemy civilization to create a "Trojan Horse" type of city. In this case, you create a two-point city on the frontier of the civilization which is technologically advanced, but keeps plenty of military firepower nearby. You should shield the city with a buffer of military units until you can build City Walls around the new city. Once the walls are completed, you should pull back the military units and allow the advanced civilization to take the two-point city.

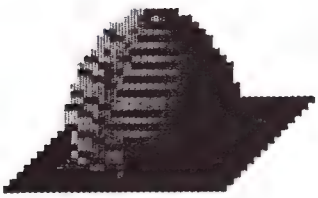
The walls will keep the two-point city from being reduced to oblivion when it is conquered (although the city *will* be reduced by one point) and it should be a simple effort for you to retake the city. The advanced civilization gets some gold for conquering the human player's city, but nothing else. Your civilization will gain a new technology by retaking the city.

Granaries

Feed me!

— Henry VIII?

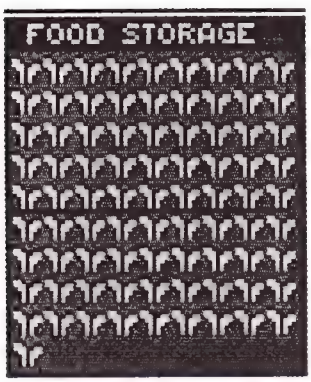
Whenever a city is not in any danger of being conquered by hostile forces, it is a good idea to build a Granary as soon as possible. Granaries require the knowledge of Pottery and cost sixty shield (production) units to build, plus one coin (monetary unit) per turn to maintain. Since, as the documentation notes, cities with Granaries only use half of their stored food to grow new population, it follows that cities with Granaries can grow twice as fast as other cities. It also



means that a random appearance of famine cannot reduce the city's population, due to the Granary's capacity to *store* food.

Here is a quick way of understanding how the availability of food affects the population growth of a city. Each point of population in a city consumes two food units per turn. Surplus food is placed in the Food Storage Box and the cities grows to the next higher number when that number times ten, plus one, units of food fills the box. For example, to grow a city from a 4 to a 5, 51 units of food would be required in the Food Storage Box.

Once a city grows, the food box is emptied and the process of filling it begins again. A Granary (60 + $1/turn) has the effect of drawing a line across the center of the Food Storage Box and, after the city grows, allowing the box to remain half full. Hence, as noted above, putting a city halfway toward its next point of population growth.



When a famine occurs, cities without Granaries will lose *all* of their food and the population of the city will immediately be reduced by one-third (rounded down). The granary keeps a supply of food on hand for such disasters, much like the biblical story of Joseph where the Israelite hero tells the pharaoh to store up grain for seven years of famine.

The bad news is that even a Granary cannot protect a coastal city from the onslaught of pirates. Pirates will deplete the entire Food Storage Box, as well as destroying whatever improvement is underway in the production box. Plus, whenever your barracks become obsolete (as a result of the discovery of Gunpowder or Combustion), pirate raids will be resurgent along coastal cities. The pirates not only deplete available food, but they also either destroy one item in the production box *or* an improvement that is already present, *usually* the Granary.

Note: After the discovery of Combustion, Granaries (as well as marketplaces) change their appearance. They do not, however, have to be rebuilt in the same way that Barracks must be rebuilt after the discovery of Gunpowder or Combustion.

Agricultural Subsidies

I always like a little salt in my fields.

— Scipio Africanus?

The importance of Granaries in *Sid Meier's Civilization* highlights a basic truth about the development of modern civilization. As Cambridge anthropologist Ernest Gellner observed in *Plough, Sword and Book: The Structure of Human History*, there was absolutely no chance of a complex division of labor and social differentiation prior to the agricultural revolution. Gellner specifically cites the institution of food storage as precipitating the emergence of a ruling and elite class.

This is vividly illustrated in the game when you call up the City Display and, as described in the section on Tax Collectors, proceed to take a square out of agricultural production. Note that taking a square out of production causes an "Elvis" to appear, but it also transforms a worker unit into an happy citizen for each two diamonds produced (see the Elite Citizen Efficiency table for the diamond production of the "Elvii"). Without adequate storage, you could not possibly contemplate taking a field out of production. With adequate storage, however, you can expect a society to become multi-tiered.

If you desire a happy society, it is often a good idea to take surplus fields out of production. However, you should never forget that the best way to create *more* food, is to have *more* farmers working around a city and to optimize the farmlands by using irrigation and railroads (which are both very efficient). Putting the miners, fishermen and elite citizens back to work farming, and creating more arable land by converting Swamps, Jungles and Forests to Grasslands and Plains, is a sure way expand the food supply. It might even be necessary for cities located in a less fertile areas to irrigate some Hills, rather than mine them, if you are seeking city growth.

Whatever you intend to accomplish in a given square, it is important to remember that pollution halves the total of all production in a square (rounded up). For example, a square producing three food units, one resource unit and two trade units would, if polluted, produce only two food units, one

resource unit and one trade unit. Ambitious readers can find more specific information on pollution in Chapter 6 where you will find a trouble-shooting guide to urban problems.

Further, the presence of other civilization's military units in a given square undermines its value. The program simply refuses to work in that square, reflecting the historical reality of armies foraging for food, as well as the fact that laborers are not likely to go out into fields that are harboring enemy troops. You may manually reassign laborers to a square occupied by another civilization's military units, but each turn the computer will move them off again.

As Brewer noted in *The Sinews of Power*, enemy troops were likely to require tribute or ransom from the civilians, at best, and to murder, rape and pillage, at worst. However, civilian contact with friendly troops was about as oxymoronic as the term friendly fire in a battle zone. Friendly forces would demand food and lodging without, necessarily, paying for them *and* were also likely to try to press civilians into military service.

Playing Tip: You should periodically check the City Display screen of each city which you control and feel free to put squares in and out of production as they meet a city's particular needs. For example, a city in need of money might want to take a wheat field out of production in order to put a Sea square with fish into production and gain the extra trade units. Also note that the areas of influence in some cities overlap. You should be flexible enough to put the square to work for the city that needs it most.

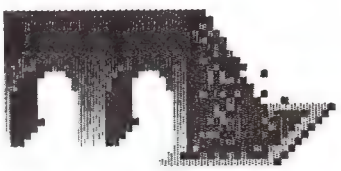
Aqueducts

What's so great about fresh water?

— Ulysses?

Although most people think of the Romans whenever they think of aqueducts, open-channeled water conduits were first used in the Ancient Near East (the Arabic term is *qanat*) and later, in Greece before the Romans ever built their magnificent aqueducts all over their empire. Aqueducts are simply gravity

flow systems that bring fresh water from a hillside water source (sometimes a well, but usually a spring) by maintaining a constant gradient. Where possible, the ancients would tunnel through hillsides that interposed themselves between the source and the destination with one tunnel slicing horizontally through the hill (*specus*) and several vertical (*putei*) shafts to provide air pressure and access for maintenance (in case of blockage).



Where the conduits traversed valleys and low spots, the Roman engineers followed a simple formula in maintaining the gradient. If they needed to raise the water conduit up to six and half feet to maintain the gradient (and sufficient earth and stone was available to accomplish the task), they would build a solid substructure (*substructio*) underneath the water channel to lift it up to the proper height. Above six and a half feet, they would sustain the gradient by building the massive arches (*arcuatio*) which form most of our mental images of the aqueducts.

Of course, the main purpose of the aqueducts was to ensure a stable supply of fresh water for large populations. Having fresh water reduced the likelihood of infectious diseases caused by microbes in the stagnant water often associated with cisterns and water holes. It also provided a source of water for bucket brigades whenever fires threatened to engulf the metropolitan areas of ancient empires.

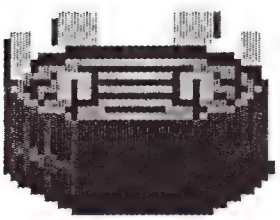
In *Sid Meier's Civilization*, this is true, as well. It is absolutely vital to construct aqueducts for any city that the player wants to grow beyond 10 in population. In addition to providing for a larger population, Aqueducts eliminate the chances of plague or fire disasters in the cities in which they are constructed.

Playing Tip: Aqueducts are not inexpensive. They cost 120 shield (production) units and cost two monetary units per turn to maintain. Since Aqueducts do not really impact your city until it is time to build beyond ten population units, it is wise to wait until cities are at nine or ten population units before expending the resources to build them.

Colosseums

It ain't over till the fat guy points 'thumbs down'!
— Spartacus?

Whether the ancient civilization involved was that of the Mayans in Central America (who played a sport vaguely resembling modern basketball); the Minoans in ancient Crete (who held both bullfights and acrobatic riding analogous to modern bullriding in the amphitheaters); the tribes of Tibet (who played an early version of polo known as *pulu*); or the classical civilizations of Greece and Rome (the former, known for the games that trained potential soldiers, and the latter, known for the gladiatorial combats that sated the thirst for blood in the Roman populace), *panem et circenses* (literally, bread and circuses) offered the key to contented populations. Whether the entertainments were structured athletic competitions, gladiatorial combats or theatrical presentations, they offered a vital ingredient to the quality of life index for any given civilization.



The colosseum of Rome and the Circus Maximus stand out as particular symbols for these raucous entertainments. The Circus Maximus (home of the infamous chariot races) would have held approximately four times the number of people as the Houston Astrodome and the arena itself was about seven football fields long. The colosseum was not only used for the gladiatorial combats between man and beast or sword-wielding gladiators versus those wielding nets and tridents, but was also reputed to have been flooded so that mock sea battles could take place for the benefit of the spectators.

The placatory benefit of amphitheaters and colosseums is presented in *Sid Meier's Civilization* when its mere *presence* in a city immediately transforms three unhappy citizens into contented citizens. Although such a transformation is extremely effective and costs fewer resources than the construction of a Cathedral (to be discussed later in this chapter), Colosseums are to be considered a short-term solution to the problem of discontented citizenry because they

require more funds to maintain on a per turn basis than the cathedrals.

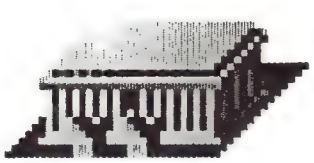
Colosseums cost 100 shields to build and *four* coins per turn to maintain. At that price, they keep *three* citizens content. Cathedrals, on the other hand, cost 160 production units to build and *three* coins to maintain. Most importantly, cathedrals keep *four* citizens content.

Playing Tip: Since it possible to sell improvements, one efficient use of Colosseum construction is to build a Colosseum when it is impossible to build a Cathedral. Then, when it is possible to build the more efficient Cathedral, sell the Colosseum and use the funds recovered to speed up construction of the Cathedral. Of course, when cities grow larger than 20 in population, however, they may well end up needing *both* a Cathedral and Colosseum to keep the people from rioting.

Libraries

The reason people put books on shelves
is to get the ideas out of their way.
— Andrew Carnegie?

From about 3000 B.C., there have been accumulations of tablets and, later, scrolls that have been stored in large repositories. Usually, as at the Near Eastern sites of Tello, Mari and Ebla, these collections of documents have been near palaces or part of a palace complex. Hence, many of the writings found therein have been little more than lists of tribute payments made to the monarch or census reports. Nevertheless, these repositories have also contained the myths, wisdom and laws of these ancient civilizations. Hence, though they were not public libraries in the sense of today's post-Carnegie grant U.S. libraries or even public in the sense of the great Museum (House of the Muses) and Library built by Ptolemy (circa 300 B.C.) to house both books and scholars, they were important in conserving the wealth of knowledge garnered by a given civilization.



In *Sid Meier's Civilization*, any civilization that has the skill of

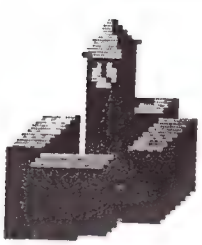
Writing, 80 production units and a monetary unit (coin) to spend each turn on maintenance can build a Library. Since Libraries tend to conserve knowledge and ideas so that scientists, engineers and technicians do not have to "reinvent the wheel" at every turn, Libraries affect the flow of the game by adding a 50% bonus (rounded down) to the number of light bulb (knowledge) units generated in a given city. Libraries should probably be held on a back burner until the civilization is ready to move into a research and development mode.

Note: As per the Elite Citizen Efficiency table, construction of a library generates an additional knowledge unit (light bulb) for each "Einstein" a city has.

Universities

If I want a degree, I'll buy it.
— William Randolph Hearst?

Universities are, in comparison with many of the public works described in this chapter, a fairly modern phenomenon. Although scholars may have congregated around the great libraries of Alexandria, Pergamum and their imitators, most students in the ancient world found themselves following a master or teacher rather than studying in residence or matriculating into a particular course of study. Indeed, the so-called "Dialogues of Plato" are essentially his lecture notes from his travels with Socrates. Such is the model of higher education prior to the formalizing of universities during the medieval period.



In France, scholars from four different nationalities (Lombards, Tuscans, Romans and Ultramontanes) congregated at Bologna toward the end of the 12th century. The scholars who assembled at these "universities" held ecclesiastical status because so many of the early scholars and, indeed, universities themselves grew out of the clergy. Nevertheless, the earliest universities were usually organizations of individuals, rather than the institutions (chartered, propertied, bureaucratic and accredited) with

which most readers associate the colleges and universities of today.

The Universities in *Sid Meier's Civilization* are of the institutional type, hence they are expensive to maintain (three monetary units per turn). The good news, however, is that Universities *not only* add 50% to a city's production of light bulbs (knowledge units), but the university bonus and library bonus are cumulative. Hence, a city with *both* a University and a Library will *double* its light bulb capacity. Note that your civilization must already have a Library *and* have already completed the University advancement in order to be able to build a University. Universities cost 160 production units to build and three monetary units to maintain. As with the Library improvement, it is wise to wait on constructing a University until you are ready to initiate a research and development mode.

Two Wonders of the World in *Sid Meier's Civilization* enhance the role of the University. Copernicus' Observatory doubles the lightbulbs produced in the city where it is built until the automobile comes into existence and Isaac Newton's College increases the effect of Libraries and Universities all over the continent (see Chapter 5 for more details).

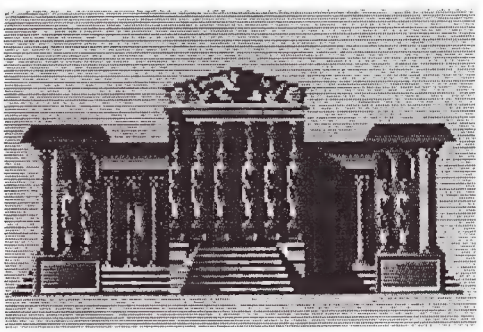
Palaces

You haven't made it, till you've played the palace.
— Marc Antony?

Thousands of years before Christ, palaces began to rival temples as the largest and most important monumental structures in a civilization. This was a sign of three factors which combine in varying proportions, depending on the actual monarch. First, many monarchs were identified as being either the actual incarnation of a deity or, at least, the earthly representation of such. This enabled rulers to proclaim a type of divine right and take authority both over and away from the priesthood. Second, since the palace embodied a *living* monarch rather than an invisible deity, it had to be more ostentatious and accommodating than even a temple would normally be. Third, the palace became an important symbol of the wealth and power of a given ruler.

The same three factors could be said to be true in *Sid Meier's Civilization*. You determine if and when ecclesiastical construction will occur and the program uses the improvement of a Palace as one of the indicators that point to how well you are doing in the game. As it was in history, the Palace is the governmental center of a civilization and power emanates outward from the monarch.

Normally, you will not have to worry about constructing or maintaining a palace improvement. This is because the palace is automatically constructed when you found your first (i.e. capitol) city. On occasion, however, when threatened by enemies or, worse yet, when your capitol building has fallen, you may have to build a new palace in another city. It is very important to rebuild as soon as possible because the loss of the palace instantly gives birth to massive corruption. This costs two hundred shields and requires Masonry skill to construct, but consistent with the initial Palace construction, requires no maintenance expenditure. Loss of the Palace also causes immediate loss of the space ark, even if said colony ship is within one turn of Alpha Centauri. Unfortunately, there is no way to recoup this loss.



Playing Tip: Should a Palace have to be rebuilt, the wise ruler will construct it in the center of the existing empire. In this way, construction of the Palace will immediately reduce corruption in an effective radius that touches more of the civilization's existing cities.

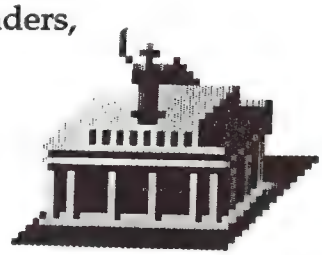
Courthouses

There's no place like home.
— Lucky Luciano?

In *Sid Meier's Civilization*, Courthouses are public buildings that will have to be added when a civilization's palace is no longer in close proximity to the farthest reaches of an empire. Like the provincial administrators of ancient empires (satraps, procurators, governors, etc.), these buildings reflect the long arm of imperial law and serve as the local representatives of

the ruler's authority. What this means for the gamer is that building a courthouse (with the "Code of Laws" advancement, Courthouses cost 80 shields and one coin per turn) will reduce corruption within a given city by 50% (rounded down).

Playing Tip: Courthouses are superfluous under Democracy (since, and we know this will be news to most of our readers, there is no corruption in Sid Meier's Democracy) and are not really required in a city with fewer than four "corrupted" arrows (trade units). Once there are four corrupted units, however, it becomes increasingly more effective to erect Courthouses (particularly on the far frontiers of your empire).



Mass Transit

I've always wanted to run one of those passenger trains.

— Casey Jones?

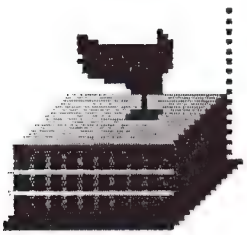
Since the 1860s, mass transit has largely been identified with commuter trains, subway trains and, to some degree, with bus systems. London was the first city to introduce a subway rail system, but metropolitan areas like New York and Paris were quick to follow. All three of these systems electrified their trains about the beginning of the 20th century. Moscow's subway was not completed until the 1930s. Today, Japan boasts one of the most impressive light rail systems in the world.

In *Sid Meier's Civilization*, the development of mass transit is a boon for the pollution-plagued player. By constructing mass transit, the game ignores the population-based factors in the pollution equations. Since these factors are heavily weighted in the equation, this is a great burden from which to relieve *any* city. Mass transit requires mass production, 160 shields and 4 coins per turn to construct and maintain.

SDI Defense

Star bright, star fight, first star I see tonight.
— [Insert the name of your favorite hawk here].

The controversial Strategic Defense Initiative (Star Wars or SDI) has been a reality since the early 1980s. It is much debated because of those who question whether or not this expensive, satellite-based defense system can work: technologically and politically. Technologically, there are many concerns about the feasibility of the system. Many were answered to most people's satisfaction when the *Patriot* missile performed so admirably during the Gulf War, while others point to the *Patriot*'s inability to control the deflection of its target, once it intercepts it, as endemic to many of the problems in the SDI program that engendered its development. Politically, the critics of the program argue that a capacity to defend *one* civilization from the nuclear threat without defending others will inevitably lead to *more* instead of *less* instability within the world community because of the fear in the have nots that the haves will use their nuclear capacity.



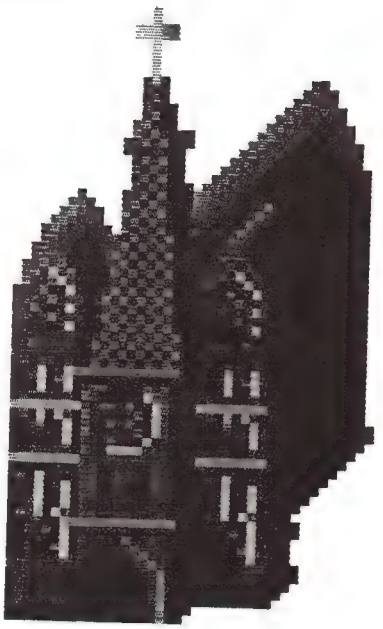
Whatever the vagaries within the real world, civilizations in *Sid Meier's Civilization* will *need* SDI as soon as one or the other computer-controlled civilizations develops the Nuclear unit capability. Cogent readers will not have to wonder how the authors know this and will not bother monitoring the authors' respective computers for simulated radioactive fallout from their earliest game saves. Such readers should simply apply the superconductor advancement, 200 production units necessary to construct such a system and then, maintain it at a cost of four coins per turn.

Ecclesiastical Monuments

I just want the simple things in life.
— Simon Magus?

Religion is one of the psychological structures that allows mankind to adhere together for a common purpose. As McNeill expounded in his classic textbook on civilization, it is

clear that *priests* served as the administrators of food production and storage "without which Sumerian civilization could not have come into existence or long survived." He describes the sacred agricultural system which allowed the civilizations of the Tigris-Euphrates valley to produce more food than the producers or even the community needed for immediate requirements as the "implausible irrationality" that enabled the " social differentiation which lies at the basis of all civilization " to occur. In Ancient Greece, for example, the unifying nature of religion was demonstrated by the Delphic Oracle and the work of its priests that played such a prominent role in assisting the cooperation between city-states.



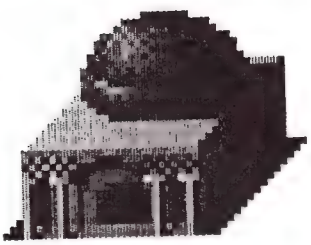
Of course, it is also true that *conflict* over religion and attempted conversion by *coercion* are also responsible for some of the forces that tend to unwind the complex strands of societal cooperation. As Voltaire is reputed to have asked in his study of Louis XIV, one wonders how it is that differences among pagan religions could be peacefully accommodated, but Christian and Muslim differences have always led to bloodshed and war? Naturally, this is an oversimplification, since any force which has the power to emotionally *unite* and *inspire* a people can also *incite* a people under the tyranny of an unscrupulous or misguided clerisy.

However, if *Sid Meier's Civilization* took the role of religion as seriously as many scholars, you would have to create *priests* as well as entertainers, tax men and scientists. Furthermore, these priests would be required in order to construct temples which would, in turn, be required *prior* to constructing granaries or irrigating fields. Instead, the game basically abstracts the role of religion into a corner of the game where its primary role seems to be that into which it was cast by Marx as the "opium of the people." The role of religion in *Sid Meier's Civilization* is basically the cynical role of pacifying the masses rather than serving as an agent for progress.

Temples

You can't put that temple here.
It'll bring down property values.
— Romulus and Remus?

In the ancient world, temples were accorded places of honor. They were built to be defended and often held the high ground of a city, either near or actually serving as the citadel. Fortress temples were extremely common in the Near East and temples constructed on easily defensible mountain sites were plentiful over both the classical occidental and oriental worlds. No less a skeptic than H.G. Wells observed in his *The Outline of History* that, "The beginnings of civilization and the appearance of temples are simultaneous in history."



The identities of many communities were tied into the presence of a temple. Indeed, ancient writings are replete with references to civic pride for distinctive temples. There is even a New Testament account where the apostle Paul is endangered because he threatens the Ephesian's loyalty to the temple of Diana.

In *Sid Meier's Civilization*, building a Temple is one of the best ways to acculturate a newly captured city into the conqueror's world view and, hence, quell the inevitable unrest. This is because the existence of a Temple immediately turns one unhappy citizen into a contented citizen. Temples require the ritual of Ceremonial Burial plus 40 shields for their initial construction and one coin per turn as a maintenance fee (tithe?).

In spite of the limitations of Religion within the game, the presence of Temples on mountain sites and their role in primitive man's beliefs in the placation of the nature gods is reflected in the ability of Temples to nullify the possibility of the random volcanic eruption (no city with a Temple can be a Pompeii or Herculaneum in this game). Also, the importance of the Delphic Oracle offers some value because it doubles the effect of all Temples (which, have already been doubled due to their prerequisite, the discipline of Mysticism) so that *four*

discontented citizens are converted into contented ones instead of the original *one* malcontent.

Cathedrals

I can't believe I lost the bid on that ceiling.

— Leonardo da Vinci?

Cathedrals represent the formalization of a religious hierarchy dependent upon a written canon of truth which is endued with a meta-theory to explain its authority. Although the citizenry of western civilizations have come to perceive cathedrals as being huge church buildings, the actual definition of the term (referring to a church building which serves as an episcopal headquarters) indicates the existence of an authoritative hierarchy that delivers its interpretation of the "divine word" to the masses. The rationale for the elaborate architecture and exquisite ornamentation revolves around the concept that more powerful and influential bishops and archbishops will have more ostentatious accoutrements. The lavish trappings underscored their authority to the common individual.

Of course, in such an authoritative hierarchy, Gellner has rightly noted, "Who checks on the interpreters?" Imposed authority in matters of faith tend to have a backlash. Hence, the existence of medieval cathedrals in *Sid Meier's Civilization* implicitly reminds the student of history of the coming Reformation. Since the job of Religion in the game is that of opiate rather than social catalyst, however, there is no place for: Reformation Theology, Evangelical Theology, Black Theology, Liberation Theology or any other theology that precipitates *change* rather than support of the establishment.

Of course, the latter perspective is good for you since you are the establishment within the context of the game. Cathedrals can be constructed by civilizations that have acquired the Religion advance and have 160 production units to spend. They cost a considerable three coins per turn to maintain, but convert *four* unhappy citizens to contented status. Further, building Michelangelo's Chapel (one of the Wonders of the World discussed in Chapter 5) will increase this conversion

factor to *six* transformed citizens until such time as communism unveils religion as the opiate of the masses. Often, they are one of the best buys in the game.

Economic Accomplishments

The check is in the mail.

— John Maynard Keynes?

"Modern society," wrote Gellner in *Plough, Sword and Book*, "is the only society ever to live by, through, and for, sustained, continuous, cognitive and economic growth". He went on to state that our world-view, ethics, political theory and economic perspectives are all based on this inherent belief in progress based on production and market forces. Indeed, the bogus quotation that begins this discussion is attributed to the economist who is most known for his theory that where real growth is taking place, a certain percentage of debt is irrelevant. So, in Keynesian Economics, deficit-spending is acceptable as long as there is a small amount of inflation. If deflation occurs, however, the consumer had better watch out.

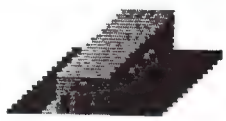
Sid Meier's Civilization recognizes that modern civilization is heavily based upon economic theory and the ideal of progress. The game does *not* subscribe to Keynesian Economics, however. The entire economy of the game is a "pay as you go" economy that will make balanced budget advocates happy. In fact, the game follows a "pay as you go" model so strictly that a word of warning is in order.

Warning: Bear in mind, when spending the treasury down to the last coin, that there might be a nasty surprise in store. While a civilization as a whole may have a revenue surplus for the turn, the computer pays maintenance costs in a city before collecting revenue from it. All cities are checked one at a time, in the order in which they are listed by the advisors. For example, the City Advisor (the **F1** key) lists all the cities in the order that they are checked at the beginning of every turn. Keep enough in the treasury, therefore, so that nothing has to be sold in the first city checked by the computer in order to cover short-term expenses.

Marketplaces and Banks

The only discount I know is the five-fingered kind.
— Vespasian?

Whether it was the bazaar of a primitive village, the agora of the Greek city-state, the various quarters in Rome named for the types of tradesmen who flourished there, the marketplaces in oriental cities or the country fairs of many European villages, the marketplace was a center for both retail and communications. Trade began with a simple barter system, but as economies became more complex, a need for currency was developed.



The move from a barter economy to that of currency is rather vivid in India during the 1st century B.C. (although currency was standardized in China during the reign of Qin Shi Huangdi circa 3000 B.C.). As ships began to reach Indian shores from Egypt, Mesopotamia and Arabia, barter was the norm. Eventually, cattle came to be substituted as a standard currency. As unhandy as this was for trading, it is not surprising that there came to be some coinage.

At first, it was copper currency, guaranteed by private individuals. This was not liquid enough for the merchants, so they developed a credit system roughly halfway through the millennium. They drafted letters of credit so that merchants in different towns could easily trade with one another. Unfortunately, the loans so transacted often held an interest rate of about 18%.

Nevertheless, the move to a marketplace economy is an important one. As Braudel commented, "every town, wherever it may be, must primarily be a market." In the game, a marketplace is even a better value for players than a bank (due to its lower construction and maintenance costs). Both banks and marketplaces accomplish the same function, providing a 50% bonus for coins (monetary units) and diamonds (luxury units). Compare the costs, however, on Table 4-2. Note, also, that the effects of both banks and marketplaces are further enhanced by the creation of "Elvii" and "Levi" to three and four diamonds or coins, respectively.

Table 4-2. Improvement Costs and Effects

Improvement Name	Prerequisite Skill	Construction Cost	Maintenance Cost	Effect
Bank	Banking & Marketplace	120	3	50% bonus to coins and diamonds
Barracks	None	40	0-2	50% bonus to military's attack/defense
Cathedral	Religion	160	3	converts 4 unhappy citizens
City Walls	Masonry	120	2	prevent floods, negate population losses from combat and triple defense bonuses for defending units
Colosseum	Construction	100	4	converts 3 unhappy citizens
Courthouse	Code of Laws	80	1	reduces corruption 50%
Factory	Industrialization	200	4	50% bonus to shield production
Granary	Pottery	60	1	increases city growth, prevents famine
Hydro Plant	Electronics	240	4	50% bonus to shield production†
Library	Writing	80	1	50% bonus to lightbulbs
Manufacturing Plant	Robotics	320	6	100% bonus to base shield production
Marketplace	Trade	80	1	50% bonus to coins and diamonds
Mass Transit	Mass Production	160	4	eliminates city's population as a factor in pollution
Nuclear Plant	Nuclear Power	160	2	50% bonus to shield production†
Palace	Masonry	200	0	reduces corruption in a certain radius
Power Plant	Refining	160	2	50% bonus to shield production†
Recycling Center	Recycling	200	2	reduces pollution by 67%
SDI Defense	Superconductor	200	4	protects against nuclear attack
Temple	Ceremonial Burial	40	1	converts 1-2 unhappy citizen(s)
University	University & Library	160	3	cumulative 50% bonus to lightbulbs

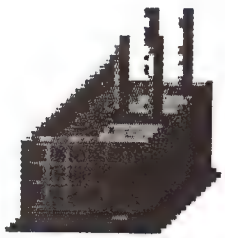
† If city also has either a factory or manufacturing plant

Factories

Funny, they all look the same to me. Another gin?
— Eli Whitney?

In the 19th century, British industrialists began to harness the steam engine to looms, spinning wheels, printing presses and the like. Suddenly, a leap in scale occurred that allowed capital increases in the size of production. It was a massive revolution that swept through Germany, the United States, Russia and Japan by the end of the decade. Whereas the British tended to be rather conservative in how fast they allowed technological innovation to be improved once they had a successful process in place, the Germans and Americans

underwent more than half of a decade of experimentation and innovation that widened the scope of industry.



In *Sid Meier's Civilization*, the Factory represents the initial phase of the Industrial Revolution. Adding a Factory to a city increases the base number of production (shield) units generated by the city by 50%, but it does *not* (as the documentation erroneously states) become more efficient when higher forms of power plants come on-line. The Production Example at the conclusion of this section demonstrates how production values are handled in the game.

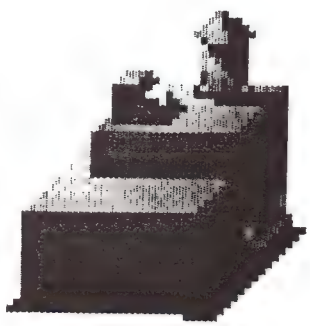
The downside to Factories is that they tend to cause a city's first pollution problems by increasing total shields produced at a given city to more than twenty per turn. See the section on pollution in the trouble-shooting section of Chapter 6.

Playing Tip: Since a Factory ceases to produce once a Manufacturing Plant goes on-line, you should immediately sell the Factory to eliminate the maintenance costs.

Manufacturing Plants

At least I don't have to deal with the robots' union.
— Henry Ford?

Manufacturing plants represent an advancement over the factories of the Industrial Revolution. Their presence in *Sid Meier's Civilization* reminds you that there is a necessity of retooling in order to keep technology working for man at its maximum efficiency. Essentially, the plants represent advances in robotics that enhance worker efficiency. Hence, introduction of a Manufacturing Plant into a city completely undermines the value of an ordinary factory. However, the bonus of a Manufacturing Plant (reflecting the increased efficiency) is 100% of a city's base shield production, effectively doubling the manufacturing base of a city.



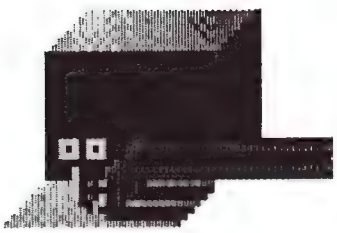
Warning: Because of the increases in production, the addition

of a Manufacturing Plant will often bring major pollution problems to a city.

Playing Tip: It should be obvious that it is advantageous to sell off a Factory in a given city just prior to the completion of a Manufacturing Plant.

Hydroelectric Plants

The engineer who designed this is all wet.
— Gamal Abdul Nasser?



Although the power of water flow had been known ever since it was used to turn the first waterwheel and grind corn or wheat, construction of hydroelectric power plants (where the water flow moves gigantic turbines) is a 20th century phenomenon. Such projects exist all over the world, provide an inexpensive and clean source of energy. Unfortunately, by the latter portion of this century, most of the available sites had already been put into service and the demand for energy continues to increase.

Sid Meier's Civilization illustrates both the positives and negatives of hydroelectric power. The *addition* of a hydroelectric plant to a city with either a factory or manufacturing plant already in place provides an additional 50% bonus (rounded down) to the city's base on shield (production) units. Furthermore, Hydroelectric Plants reduce a city's *industrial* pollution by 50%. However, the lack of suitable sites in the world is expressed in the fact that hydroelectric projects can only be built on or near River or Mountain squares.

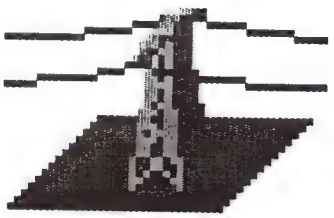
Note: Hills do *not* work for these, in spite of what the original documentation stated. Hydroelectric Plants require electronics knowledge and 240 production units to construct, as well as four monetary units per turn to maintain.

Playing Tip: The Hoover Dam wonder is the same as having a Hydroelectric Plant in every city on that continent. In other words, it will increase production by 50% in every city on the continent which has a Factory or Manufacturing Plant in it and reduce *industrial* pollution by 50% in every city. It also makes all other energy sources on the continent redundant, so

go ahead and sell them (but protect the Hoover Dam at all costs if you do!).

Power Plants

When I look at my electric bill, I know I've created a monster.
— Thomas Alva Edison?

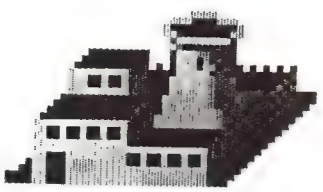


Although most of the early electrical power plants were driven by fossil fuel consumption which, in turn, generated power, *Sid Meier's Civilization* does not penalize you for their pollutant effects. To be sure, the game does not *decrease* pollution when these plants are in operation (which it does for other energy sources), but neither does it *increase* pollution except to account for its increase in shield production. Power Plants require refining skill and 160 shield units to construct and two coin units per turn to maintain. Once constructed, they provide a 50% bonus to the base shield production of any city which already possesses either a Factory or a Manufacturing Plant.

Playing Tip: To decrease pollution at later stages in the game without minimizing production, you should consider selling the Power Plants and replacing them with Nuclear or Hydroelectric Power.

Nuclear Power

Our rods and our staff should comfort thee.
— Homer Simpson?



The authors of this book are split on the safety and usefulness of nuclear power. Wilson's concern on the issue is well-documented in *The SimCity Planning Commission Handbook* in which he cites more than ten nuclear accidents, dating back to a reactor fire in the United Kingdom in 1957. Emrich believes that the anti-nuclear movement is irresponsible and regressive, leading to a decline in productivity.

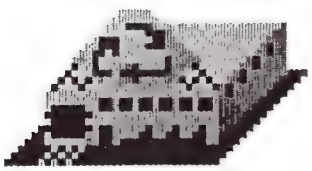
Sid Meier's Civilization essentially splits the difference within the authors' dichotomy. Building a Nuclear Power Plant within the game context provides a plentiful, cheap (to

maintain) and "clean" supply of power which, in turn, provides a 50% boost in the base shield output for a given city and lowers the city's *industrial* pollution by 50%. Acknowledging Wilson's concerns, Meier has designed a minimal chance of meltdown which is increased whenever a city is in civil disorder (reflecting new possibilities of sabotage?). Performing to Emrich's specifications, the Nuclear Power Plant is the cheapest source of energy available in the game and the risk of meltdown is not only minimal, but is totally removed whenever the nuclear user discovers the advance of Fusion Power.

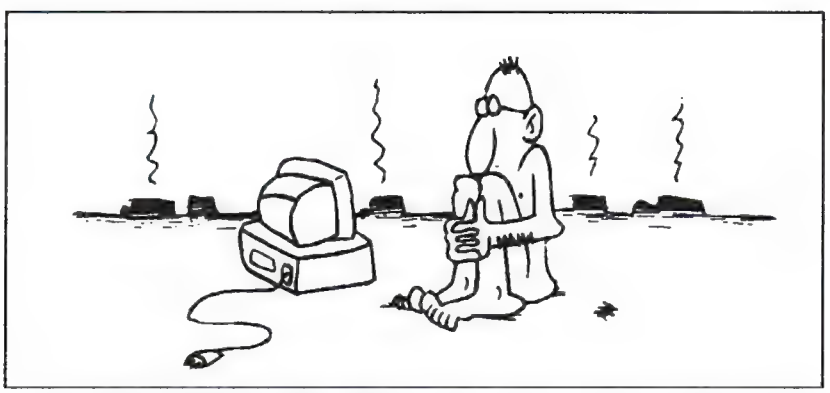
Recycling Centers

Throw it away. It's just a soup can.

— Andy Warhol?



Just as recycling centers (which separate trash, reduce it to its basic elements and return those elements to productive use) are a relatively new facet of modern civilization, so are these plants in the game context. You will have to discover the Recycling technology and add 200 production units to it in order to construct one. Then, you will have to pay two coins per turn to maintain it. The good news is that Recycling Centers supersede both Hydroelectric and Nuclear Power Plants in the pollution reduction formula (which cut *industrial* pollution by 50%) and actually reduce the industrial pollution in a given city by a full 67%.



PERHAPS I WAS A BIT HASTY IN BUILDING THOSE NUCLEAR UNITS

Production Examples

The examples in the following table assume that a city has a base production of 17 shield units. If a city with base production of 17 shields had [insert one of the conditions from the left most column], it would produce [the amount from the right most column] shields.

Table 4-3. Production Level Examples

Production Situation	Base Production	Factory or Mfg. Plant	Power Plant	Total Production
No Factory or Mfg. Plant	17	0	0	17
A Factory but no energy source	17	8	0	25
A Factory with an energy source	17	8	8	33
A Mfg. Plant with no energy source	17	17	0	34
A Mfg. Plant with an energy source	17	17	8	42

Important Note: The rules (and supplements) erroneously state that energy sources modify the production bonuses of Factories and Manufacturing Plants. This is incorrect. *All resource production bonuses are straight additions to the city's base resource production as shown in the example above.*

Check Your Passport

I knew I should have turned left at the Himalayas.

— Marco Polo?

This chapter should have provided insights on the basic building blocks of a city (the city improvements) and their advantages and disadvantages within the game, as well as providing capsule references regarding their impact on the history of civilization. The next two chapters will further the thrust of this chapter by delineating the possibilities for scientific/technological advancement, as well as putting all of the building blocks together in Chapter 6, "The Government of Civilization."

Chapter 5

A Word to the Wise

Technological Advances

One helpful function of a travel guide is the capacity of helping travellers find the hidden culture underneath the facade which many countries or cities erect specifically for tourists. When you can know where the locals prefer to dine and what they like to do, you can have a better sense of what a place or culture is *really* like.

Imagine that you have a limited amount of time to visit Paris and you wish to make sure that you make the most of your time. You decide to use the Metro in order to get quickly from one location to another, but you have no idea whether you should visit the Eiffel Tower, the Sorbonne, the National Archives, Notre Dame Cathedral, the Opera House or the Bastille as the first point on your itinerary. A wise traveller would probably compare a map of Paris, a route map of the Metro and the hours of operation for each point of interest in order to construct the most efficient possible itinerary.

This chapter is your travel guide through the mechanics of *Sid Meier's Civilization*. In alphabetical order, it presents every technological advance which can be chosen in the game in both graphic and text form. Note, however, that three of the advances are technically out of order according to a strict alphabetical order. The Corporation, The Republic and The Wheel are found under "T," just as they are in the Civilopedia. The right hand pages of this chapter provide the graphic perspective for each technological step forward. We call these charts the "Pyramids of Progress" because they have the prerequisites for each advance as their foundation; the new technology or discovery itself as the top of the pyramid; potential city or military improvements alongside as annexes to the pyramid itself; new technologies presented as potential new pinnacles for the pyramids and important game hints

which underlie the entire structure (the hidden truth beneath technological advancements in *Sid Meier's Civilization*. Those "continuing advances" (i.e. above the pyramids) which have their prerequisites in italics indicate a special opportunity for speedy research. Italicized prerequisites are ones which, of necessity, a player must already possess *before* being able to acquire the main advance on the page (the advance superimposed over the large pyramid). Therefore, you should be in a position to pursue those continuing advances (with italicized prerequisites) *immediately* upon receiving the advance in the small pyramid directly beneath it.

The left side of the page offers a brief summary of the history of each advancement; an assessment of its overall importance in Sid Meier's Civilization and suggestions for using the advancements within the game's context. In some cases, you may notice a difference in perspective between the material presented on the left-hand side of the page and that on the right. We think of this as a "Point/Counterpoint" feature with the liberal Dr. Wilson on the left and the conservative Mr. Emrich on the right.

Although, at first glance, it may appear that the chart provided in the documentation is sufficient, there are several problems with the chart. For example, the manual visually obscures certain chronologies by placing certain prerequisites to the left of the succeeding advances (i.e. placing Flight to the left of Combustion) in order to get all of the advances on one fold-out chart. So, we have attempted to present each technology in such a way that you can see the necessary prerequisites at a glance and follow the potential development of the technology upward like a flow chart.

How to Use This Chapter

You architects know all the angles.

— Raamses II?

This chapter provides an alphabetical reference to "technological advancement" which should allow you to check the blueprint (prerequisites, future advancements, and residual benefits (in city improvements, wonders of the world and military units). This means that when the game asks you

what new advance your wise men should be studying, you can look at the pages for each advance listed on the screen and immediately see what advantages there are to choosing each one.

If, then, you want to build up your army's offensive capacity as fast as possible, you might look at the Alphabet pyramid chart and realize that Alphabet plus Masonry will give you Mathematics. With Mathematics, you will immediately be able to build Catapult units. Plus, you can see the four other potential advances which you can achieve by adding other technologies to Mathematics (e.g. Astronomy with Mathematics plus Mysticism or Physics with Mathematics plus Navigation). If, of course, you wanted to build the Lighthouse wonder before anyone else, you would look at the Alphabet pyramid chart and realize that you must develop Alphabet, Masonry, Mathematics, Mysticism, Map Making, Astronomy and Navigation in order to have the knowledge base necessary to build the Lighthouse.

Note that you will not necessarily have the option to build all of the technologies which should theoretically be available for you to build at any given time. Even though you may have completed the prerequisites for a particular technology, there is a random factor with regard to which possible advances will show up on your selection menu. Sid didn't believe that you should have the option of building *anything* whenever you want to. He recognized that there is a random factor to technological advancement, a chance factor in scientific discoveries that cannot be counted on in every situation. So, there will occasionally be times when you might be working toward the Lighthouse wonder and might have to develop Map Making ahead of Masonry and Mathematics because Masonry did not show up on your list of possible advances. By using the "Pyramids of Progress," you should be able to substitute an appropriate advance without losing any ground.

Playing Tip: When using the "Pyramids of Progress" to choose between new technologies, be sure to write down all of the advances necessary in order to reach your desired goal. As more choices become available, it becomes harder to remember what the original path you desired might have been.

Advanced Flight

With a few changes, I could make a cow fly.
— Clarence "Kelly" Johnson

After World War I, development of aircraft began to accelerate. Initially, war surplus planes served as vehicles for barnstormers and daredevils, as well as transportation for expanding air mail routes. The air mail routes paved the way for air transport routes, initially military in nature but soon expanding to luxury airliners. Europe had the initial advantage because the distances air transports had to traverse were shorter than in America and nationalistic fervor led to an informal competition in both civil and military aviation during the '20s.

The Germans led the way in moving from wood and fabric aircraft to the all-metal construction of the Junkers and Dorniers. By the 1930s, even civilian aircraft such as the Douglas DC-3 featured metal skin, engine cowlings which reduced fuel drag, wing flaps and variable pitch propellers. During World War II, the requirements of military aircraft for higher performance values expanded the technology and, once again, the Germans led the way by developing jet aircraft.

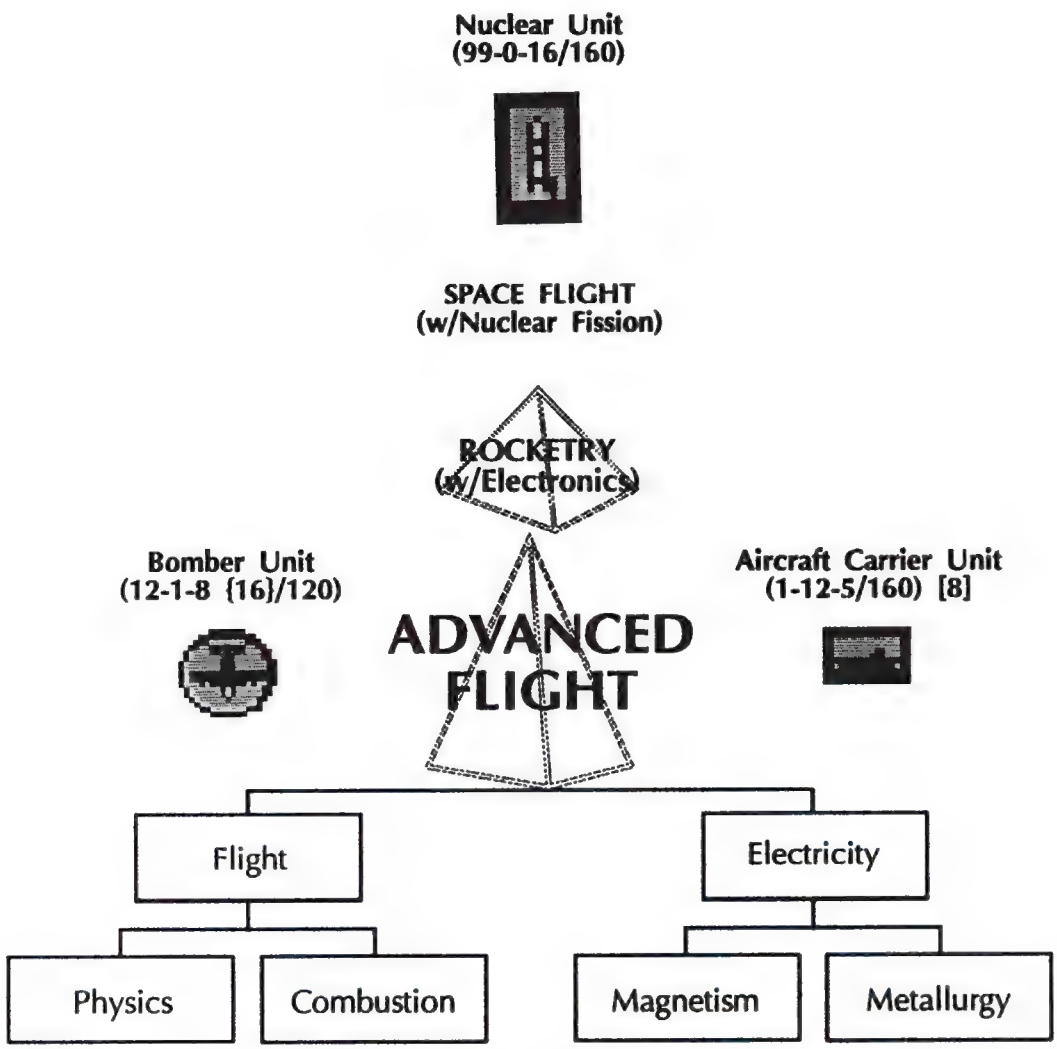
Naturally, once the war was over, this technology came to the United States and supersonic jets like the Bell X-1 (1947), North American's X-15 (1957) and Lockheed's U-2 provided much of the technological "know how" that propelled humankind into the Space Age.

In *Sid Meier's Civilization*, Advanced Flight allows you to build Bomber units and Aircraft Carrier units in order to increase your military capacity, as nations did during World War II. It also permits you to add Electronics and then, Rocketry on your way to both Space Flight and the Nuclear unit that turns you into a Cold War-style superpower.

Playing Tip: Advanced Flight will enable you to build the best defensive unit in the game (the Aircraft Carrier unit) and ramp up toward space flight. Naturally, would-be conquerors love this technology as a stepping stones to Bomber and Nuclear units with their massive destructive potential.

A

Advanced Flight



Advanced Flight is an important milestone on the road to Space Flight and the colonization of Alpha Centauri. The immediate military advantages of obtaining Advanced Flight, however, are impressive. Aircraft Carrier units possess the best defense in the game and, when parked in a city with City Walls, can be very difficult to kill. Bomber units, on the other hand, are a fine offensive threat. They can block, pillage, ignore City Walls when attacking and can be based on Carriers for added mobility. While not an urgent discovery, Advanced Flight is certainly an important and highly useful one for both war mongers and space colonizers.

Alphabet

Where did you earn your letter?

— Hester Prynne?

An alphabet is, of course, a written representation of sounds which can be combined into syllabic symbols of concepts and stored on a neutral medium. Said medium could have been clay tablets, pottery sherds, papyri, stones and dried animal skins in the ancient world. In the modern world, said medium can as easily be paper (loose or in books) or magnetic and optical media. The primary advantages of having an alphabet is the capacity for storing information for future use and the ability to transfer information to another (or others).

It is, therefore, no surprise that one of the earliest technologies developed by most civilizations is the capacity to communicate in writing. In ancient Ugarit, a city in what is now Lebanon, the alphabet consisted of 32 characters presented in cuneiform fashion. The rigid wedge-shaped cuts which formed letters in Ugarit, eventually gave way to the less rigid free-form strokes of the 20-30 character alphabets of Early Phoenician and Ancient Hebrew. These *alephs* and *beths*, in turn, evolved into the *alphas* and *betas* of Ancient Greece. These characters (from which we get the term "alphabet" by combining the names *alpha* and *beta*) proceeded to influence the Etruscan and Latin alphabets from which most Western alphabets are derived.

Just as the transfer of knowledge over distances and generations requires the capacity for written language, *Sid Meier's Civilization* treats the Alphabet advancement as the primary building block for most other advances.

Playing Tip: The Alphabet advance is almost always the first technology you should develop. Exceptions to this generalization might be when you begin the game close to a Mongol civilization or where your initial continent has such limited production capacity that you need to insure your citizen's well-being by developing Pottery first in order to build a granary.

Courthouse

MONARCHY
(w/Ceremonial Burial)

TRADE
(w/Currency)

LITERACY
(w/Writing)

THE REPUBLIC
(w/Literacy)

CODE OF LAWS

Trireme Unit
(1-0-3/40) [2]

Lighthouse

NAVIGATION
(w/Astronomy)

MAP MAKING

Catapult Unit
(6-1-1/40)

ASTRONOMY
(w/Mysticism)

PHYSICS
(w/Navigation)

UNIVERSITY
(w/Philosophy)

COMPUTERS
(w/Electronics)

MATHEMATICS
(w/Masonry)

Diplomat Unit

Library

RELIGION
(w/Philosophy)

LITERACY
(w/Code of Laws)

WRITING

ALPHABET

All good things spring forth from the Alphabet. With the possible exception of Pottery, it should be the first thing a player researches. Period. Short of urgent military necessity requiring Bronze Working (i.e., the empire is under immediate attack or the danger thereof is imminent), don't waste a moment. Get it in writing with the Alphabet!

Alphabet

Astronomy

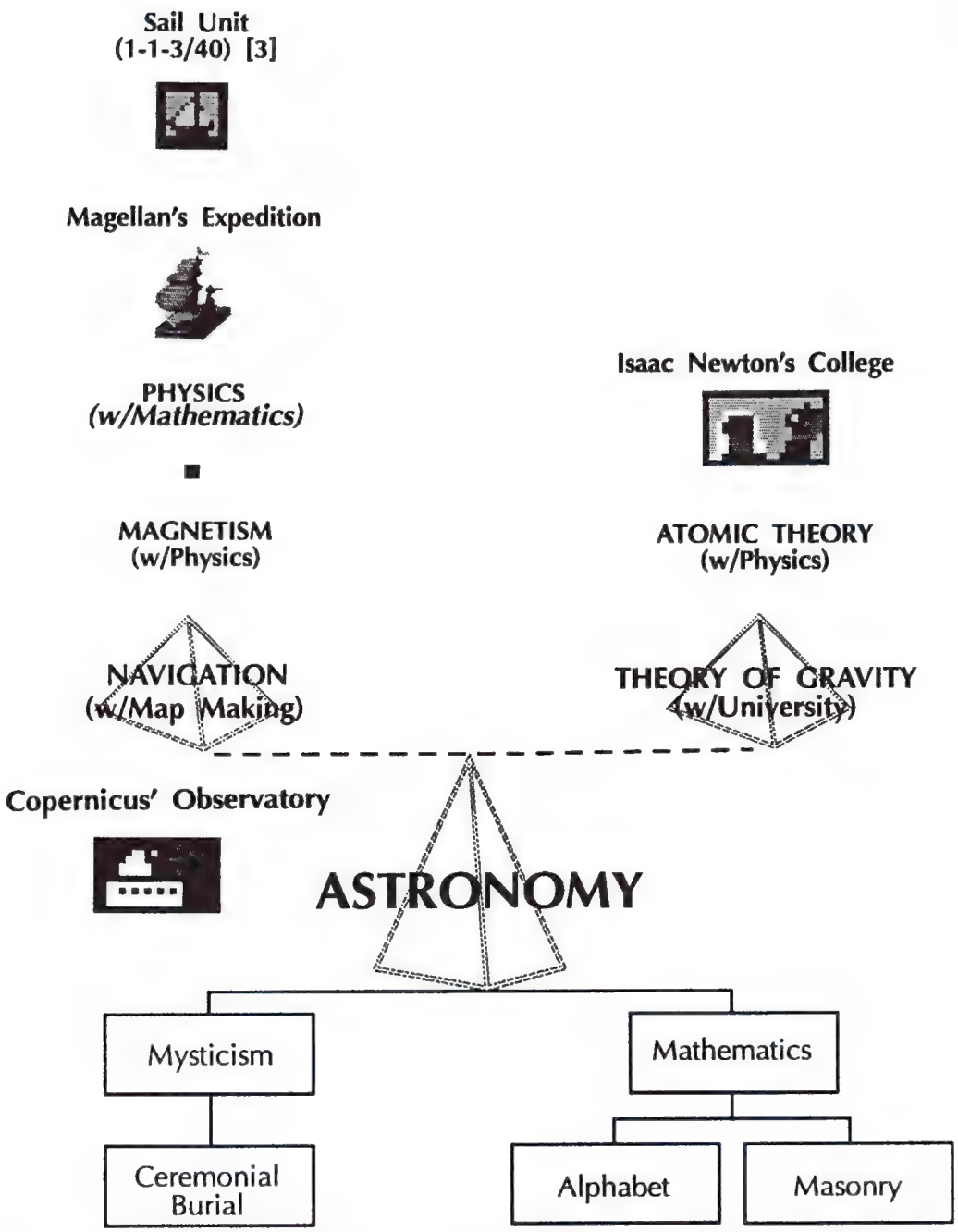
I'm flat out right, and that's all there is to it!
— Copernicus?

From ancient times, humankind has been mesmerized by the night skies. The patterns of the constellations were perceived to correspond to the rhythms of everyday life. The occasional astral phenomena was, of course, considered to be an omen of an irregular interruption of life's routines. The priests who were able to interpret the regularities of the seasons were expected to be able to clarify the omens to be seen in the sky as the omens, in turn, corresponded to potential dangers and opportunities in the ordinary individual's life. In Babylon, the priests combined the science of observation with the religion of celestial influence in order to provide their interpretations by peopling the skies with celestial beings which influenced the movements of ordinary citizens. The Greeks divided the sky into the twelve signs of the Zodiac and the basis for astrology was forged (thus, the link between Astronomy and Mysticism in *Sid Meier's Civilization).*

During this period when astrology was the norm, Ptolemy became the harbinger of astronomy over astrology. This is true even though Ptolemy's *Tetrabiblos* contained two books which were distinctively astrological in nature. However, Ptolemy demonstrated the need for precise mathematical calculations and pioneered the geographical method of listing latitude and longitude.

Eventually, the work of Copernicus, the observations of Galileo and the calculations of Kepler were to pave the way for the modern science of astronomy. Astronomy was one of the first of mankind's great intuitive leaps in attempting to describe how the unseen forces a great distance away could affect the everyday lives of humanity. From such a leap, it seems natural to move to a discipline where mathematical calculations and physical observation enable scientists to conjecture about gravity and cosmology.

Playing Tip: Astronomy is an absolutely essential building block for you to develop in order to build ships or move toward modern science.



Astronomy is primarily a stepping stone on the way to Navigation, which leads to the crucial, world-exploring Sail units and the never-expiring Magellan's Expedition wonder. From there, the next step is to Physics, which opens the doors to such important advances as Magnetism (and Frigates), the Steam Engine (with Ironclads and the Railroad) and Flight (which is the key to the stars and your entire space program).

Atomic Theory

Let's see what you're made of.

— Albert Einstein?

In the 5th century B.C., two Greek philosophers (Leucippus and Democritus) posited the idea that all matter consists of innumerable combinations of small building-block particles called atoms. These atoms were described as building blocks because they were perceived as the most basic element of reality. This perception carried the favor of scientific and philosophical thinkers until it gradually fell into disrepute during the medieval period.

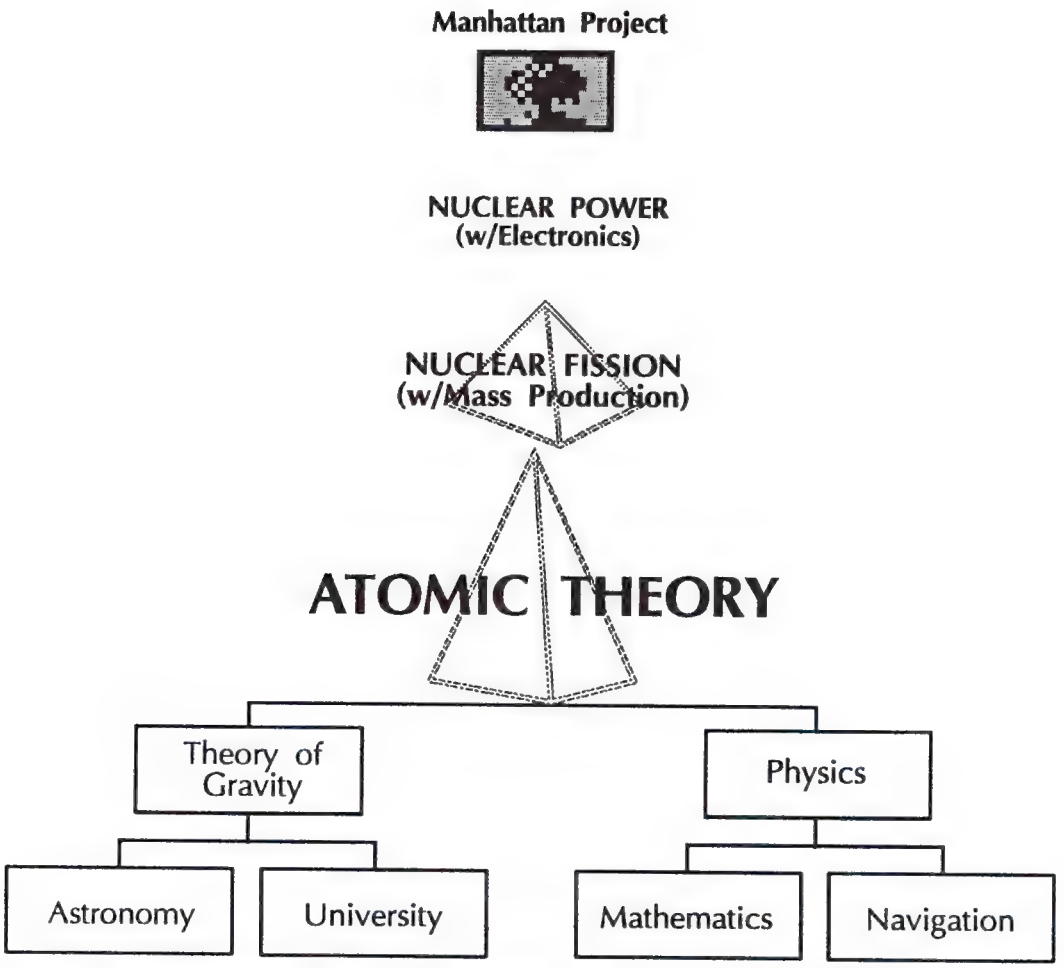
In the 17th century, however, there came to be a revival of the theory due to the emphasis on a science of mechanics and the victory of the wave theory in the study of light refraction. By the 19th century, the scientific world was ready for more scientific proof of the theory. This they received in John Dalton's *A New System of Chemical Philosophy*. Dalton used his quantitative observations of the combinations of chemical gases to postulate that all atoms of a given chemical have the same make-up; chemical reactions are tantamount to the reorganization of atoms into new "compound atoms" and that there are relative weights between the atoms of various elements. Dalton's work inspired a sequence of research that was to engender Mendeleyev's periodic table of the elements.

The 19th century was also to give rise to Planck's constant, Sir William Crookes' discovery of the cathode ray, Wilhelm Rontgen's discovery of the X-ray and the discovery of isotopes. All leading to the development of our current understanding of Atomic Theory. In *Sid Meier's Civilization*, the Atomic Theory advance is more of a nod of recognition than a vital building block.

Playing Tip: Ironic as it seems, you will not need to put a high priority on developing Atomic Theory until you need a safe and clean alternate energy source. If you want Nuclear units, you simply have to wait until some other civilization builds the Manhattan Project wonder.

A

Atomic Theory



Atomic Theory offers very little as an Advance. While a step toward Nuclear Fission and the Manhattan Project wonder (which allows ALL players with the technology to create Nuclear units), this Advance's only other redeeming asset is as a step toward the long term development of safe nuclear power as an alternative energy source which will help reduce industrial pollution during the later stages of the game. You're probably better off "fission" elsewhere.

Automobile

I'd rather be caught than steal a Chevy.
— Clyde Barrow, of Bonnie and Clyde fame?

Although there were attempts at self-propelled vehicles prior to his invention, one of the earliest automobiles was built by the German physicist, Otto von Guericke. In the 17th century, von Guericke built an air-powered vehicle that used metal pistons, cylinders and connecting rods. In the same century, a Dutch scientist (Christian Huygens) invented an air-powered engine that required a gunpowder charge to propel the vehicle.

Sid Meier's Civilization requires you to develop Combustion prior to developing the Automobile, so it is clear that the game context is focusing exclusively on the internal combustion engine. Several scientists managed to build steam engines during the period between 1769 and the latter part of the 19th century when automotive giants such as Carl Benz, Gottlieb Daimler, James Ward Packard and Ransom Eli Olds began experimenting with internal combustion engines based on the four stroke engine approach. It is upon this latter sequence of development that the modern motor car relies.

The early years of the 20th century are fondly remembered as the era of the classic luxury cars. The inception of the Rolls Royce and the glory years of the Bugatti, Duesenberg, Packard and Pierce-Arrow are to be found in the first third of the century. Most of these classics offered a standard chassis and allowed the purchaser to have a custom-made body placed thereon. By the time many of these same manufacturers had geared up for mass production of military vehicles during World War II and returned to regular production, however, the era of the custom automobile was over. In *Sid Meier's Civilization*, the conversion from automobile manufacture to that of military vehicle production is important.

Playing Tip: The Automobile advance is definitely worthwhile if you want to boost your military capacity with Armor and Submarine units. Just make sure you get Mass Production right after you develop Automobile technology.

NUCLEAR FISSION
(w/Atomic Theory)

■

SUPER CONDUCTOR
(w/Plastics)

■

RECYCLING
(w/Democracy)

■

LABOR UNION
(w/Communism)

Submarine Unit
(8-2-3/50)

MASS PRODUCTION
(w/The Corporation)

Mass Transit

Armor Unit
(10-5-3/80)

Automobile makes
Copernicus' Observatory
and Knight Units Obsolete

AUTOMOBILE

Combustion

Steel

Refining

Explosives

Metallurgy

Industrialization

The Automobile advance is a can of worms. While allowing players to build the best overall unit in the game, Armor, it makes Knight units obsolete and also measurably increases your pollution headaches. In particular, a full 50% of the population now adds to the pollution problem (double the 25% caused when the advent of Industrialization occured), in addition to the industrial pollution caused by resource production. Fortunately, it's one step away from Mass Production (where Mass Transit ends a city's population pollution problems) which leads to Recycling (where Recycling Centers will keep industrial pollution to its lowest possible levels).

GRAPHICS NOTE: Modern roads now appear in the View City display and modern soldiers march in front of a conquered city if the conqueror has acheived the Automobile.

Banking

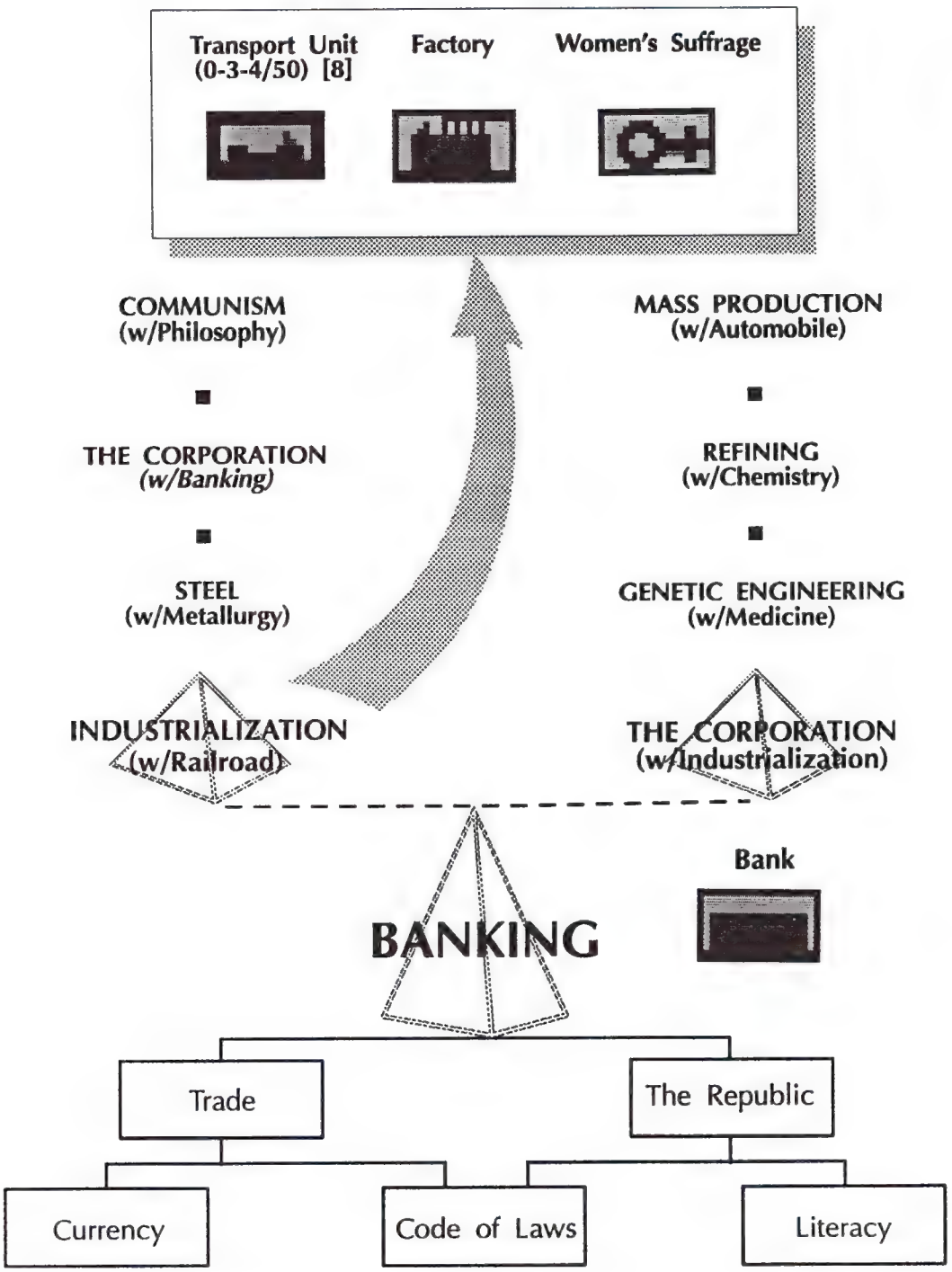
The truth is, money grows on fees.

— J. P. Morgan?

Bankers, or at least their equivalent, have existed since hundreds of years before the Christian era. Notes and checks were present in ancient Babylon, Greece, Alexandrian Egypt and Rome, as well as in China from approximately the 9th century onward. Today's bankers derive their name, however, from the 14th century Italian moneylenders in Florence who took the name *bancherii*, based on the bench (*banco*) on which they sat while they did their business. Monetary exchange, as well as the provision of letters of credit to keep the burgeoning import and export business of Florence fluid, was so vital to the health of this urban center that there were eighty different banking houses in the city by the start of the 15th century. Florence was the financial capital of Europe during this period.

By the 17th century, national banks were being established in many countries (e.g. the Bank of Stockholm and the Bank of England). In *Sid Meier's Civilization*, the Banking advance represents, to a large degree, a fiscal policy where monetary policy means mass and momentum. This is the pre-Keynesian assumption that the increase of money supply increased the mass of goods in the economy or accelerated the economy's momentum. Either way, prices and the amount of economic activity goes up as, eventually, do wages. This phenomenon of mass and momentum can be observed in the effect that Banks have on a civilization's economy in *Sid Meier's Civilization* (adding Banks to Marketplaces doubles a city's income and luxuries). The accelerator effect can also be seen in the fact that you must have the Banking advance in order to have enough potential capital to develop your Industrial capacity.

Playing Tip: Capital is power. So, if you are not planning to gain all of the advantages of Industrialization by conquering rival cities, you will need to develop Banking around the middle of the game. Otherwise, you not only lose out on the generation of new wealth, but you also hinder your technological growth.



Banking serves two important functions. Primarily, it is half of the ingredients necessary for the vital advance of Industrialization. This is critical for both Factory Improvements (to increase resource production), plus the Women's Suffrage wonder (which allows representative governments to more easily march off to war). An important secondary bonus is the ability to build Banks which increase luxury item and coin production by 50% (which, in addition to the +50% for the Marketplace improvement which must already exist in a city before a Bank can be built there, will, in effect, double the city's luxury item and coin production).

Bridge Building

I wonder if I can sell this idea in Brooklyn.
— Mayor Jimmy Walker?

It is almost certain that the first bridges were simple affairs in which primitive men pushed tree trunks or long flat stones across small creeks in order to facilitate their crossing. From there, it was a technological leap to use rock outcroppings on each side of the stream or river as the piers upon which the early engineers could place the flat wooden construction of the bridge walkways. From there, it became more common to place mounds of stones in the water itself in order to support the bridge's span.

Although Greek and Persian bridges preceded the establishment of the Roman Empire and the Etruscans had, at least, two permanent bridges across the Tiber river, it is the Romans who are most remembered as bridge builders in the ancient world. That Bridge Building was important to the Romans can quickly be illustrated by the fact that the highest ecclesiastical office in Rome was the *pontifex maximus* (highest bridge builder). The reason for the emphasis is that the Romans needed to continually improve their techniques at Bridge Building in order to maximize the accessibility of their prodigious and far-reaching system of roads which, in turn, guaranteed mobility of any troops which could be needed to quell disturbances and keep the peace anywhere in the empire.

Playing Tip: In *Sid Meier's Civilization*, Bridge Building is not only necessary to facilitate the movement of military and caravan units over River squares, but the Bridge Building advancement also symbolizes the engineering skill necessary to span rivers, lakes and inlets with iron girder, arch and suspension bridges required prior to the Railroad advancement. Since the latter advancement greatly enhances your civilization's productivity, Bridge Building is as important to develop in peacetime as during war.

B

Darwin's Voyage

INDUSTRIALIZATION
(w/Banking)

RAILROAD
(w/Steam Engine)

BRIDGE BUILDING

Iron Working

Bronze Working

Construction

Masonry

Currency

The immediate benefit of acquiring Bridge Building is that it allows you to build roads (and, later, railroads) on River squares. This can be important if a major river bisects your empire and cuts off cities from being mutually supported by a completely connected military road network or on "wet" worlds with many River squares. The crucial part about Bridge Building, though, is that it is one of the two Advances required for the Railroad. Although it will usually take a while to discover the other Advance (which is the Steam Engine), you can't start building railroads fast enough, for their benefits are tremendous.

Bronze Working

Doesn't she look a little green around the gills?
— Anonymous child viewing the Statue of Liberty?

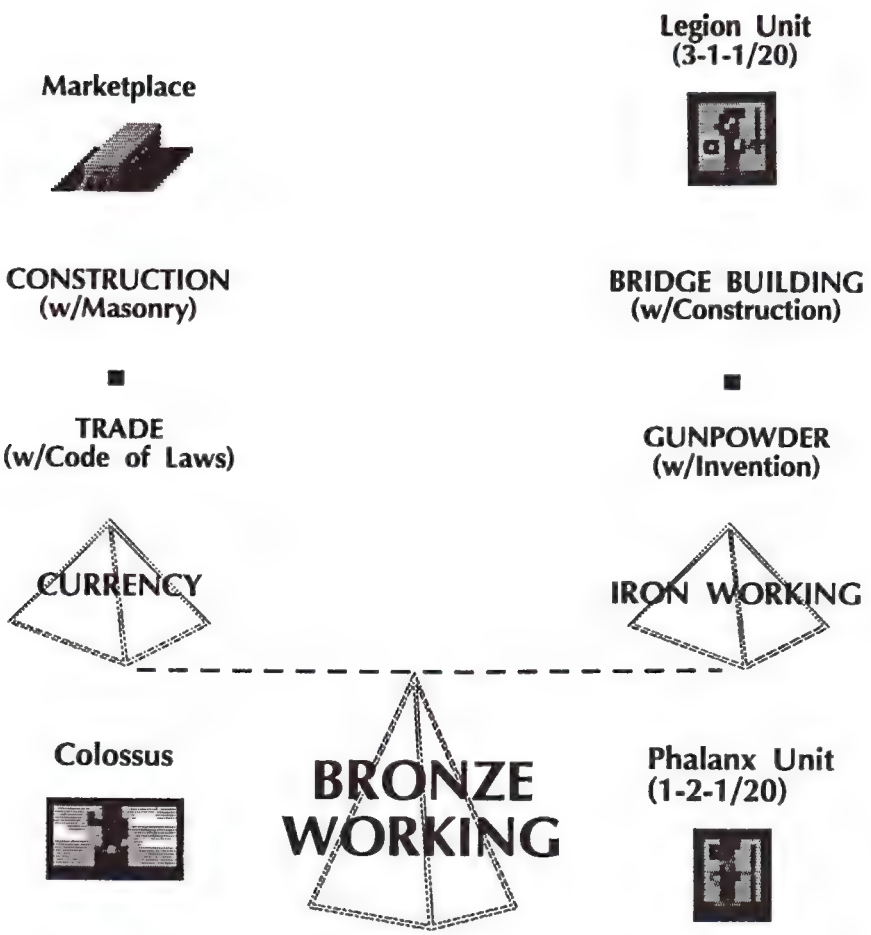
Bronze is an alloy made from combining copper and tin. At various times, the mixture has featured as little as 2/3 copper to 1/3 tin and as much as 95% copper and 5% tin. The proportions depended largely upon the availability of tin. In later periods, zinc was added to the mixture in order to create a more durable bronze for statuary.

In *Sid Meier's Civilization*, the Bronze Working advance recognizes the fact that bronze is one of the hardest metals known to early civilizations (it is even harder than iron, but iron advanced civilization because iron ore was more readily available in quantity than copper ore and tin) and is easier to melt and cast than its constituent elements. The alloy's durability is reflected in your ability to build a solid defensive unit, the Phalanx, after attaining Bronze Working and the ease of casting is portrayed by making Bronze Working a prerequisite for the development of Currency and its subsequent economic advantages (Marketplace and Trade).

The so-called Bronze Age, where civilizations began to build less-expensive and more effective tools and weapons out of the alloy, began in different millenia in different geographical areas. The Bronze Age in the Middle East can be dated to 3000 B.C., for example, while it can only be traced to approximately 1800 B.C. in ancient China. The reason for the disparity is most likely the ready availability of copper and tin in the Middle East as opposed to the rarity of the metal ores on the Chinese mainland.

Playing Tip: The closer you find a neighboring civilization on your continent, the higher you should prioritize this advance. Bronze Working will enable you to build the strongest defensive units available in the game prior to the invention of gunpowder so you can garrison your city and go on to more productive matters. Then, you should build the Colossus wonder and move up the economic track from Currency, Marketplace and Trade up to Banking in order to get maximum efficiency from this advance.

B



Bronze Working

During the early stages of the game, Bronze Working is an important discovery. Primarily, it allows you to build a good defensive unit, the Phalanx unit. These will be important city garrisons for many, many years (until the invention of Gunpowder). The Colossus wonder is also useful in that it is one of the cheapest to construct (at only 200 shields) and greatly increases trade arrows in the city where it is built. Bronze Working is also the building block for both Iron Working (and the Legion unit) and Currency, which allows for the construciton of Marketplaces and is the gateway to Trade.

Ceremonial Burial

All things considered, I'd rather be in Siberia.
— Inscription on Lenin's Tomb?

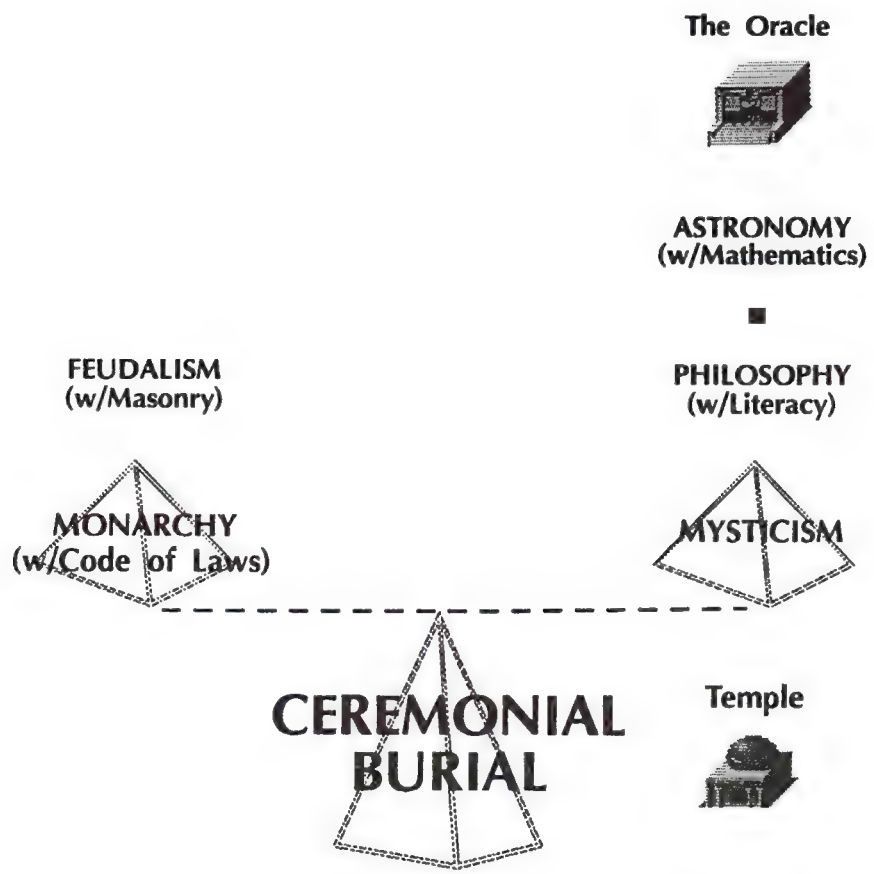
Ceremonial burial is an early and significant concept in the development of western civilization. The placement of food and tools in caves with the dead in Sumer, the necropolis of early Jericho and the tombs of Egypt indicates that there was some perception of, at least, a shadowy afterlife. Rituals for appropriate disposition and preservation of the dead served to enhance the power of a priestly hierarchy who could not only threaten the living with the possibility of an unpleasant afterlife to them personally, but could threaten the living on behalf of their dearly departed, but often carefully preserved.

Of course, the most painstaking example of ceremonial burial is the mummification of important personages in Egypt. Believing that the *ka* (soul, breath) could exist in a shadowy existence as long as the body was provided for, Egyptian wise men developed a science of embalming. They removed the brains and viscera, replacing them with myrrh and other spices as preservatives. They then sewed the bodies shut and placed the brains and viscera in special pottery designed for that purpose. Then, they soaked the bodies for up to 70 days in a solution which consisted of salt and aluminum. This was followed by wrapping the corpse in the famous cloth bandages and sealing the bandages with gum. Then, the mummy was placed in its sarcaphogus and placed in its tomb.

In *Sid Meier's Civilization*, Ceremonial Burial is a prerequisite to the development of *any* religious authority. You will need this advance in order to build Temples, develop Monarchy or study Mysticism as the gateway to Philosophy and, through Astronomy and Mathematics, the natural and physical sciences.

Playing Tip: You *need* Ceremonial Burial because it consolidates your power by pacifying the populace and allows you to develop Monarchy. You definitely need to achieve this technology during an early period of the game if you expect to succeed as primarily a peaceful state with potential for representative government.

C



Don't let the name fool you, in Sid Meier's Civilization, Ceremonial Burial is a "biggie." The immediate effect of its discovery is to allow you to build Temple improvements which mollify unhappy people and prevent volcano disasters. This Advance is particularly crucial early on in games played at the higher difficulty levels. Ceremonial Burial is also a building block to the two important advances of Monarchy (and the player's first government upgrade) and Mysticism (which doubles the benefit of temples, allows for the building of the Oracle wonder, and moves a player another step toward Sail units, Democracy and Religion). Ceremonial Burial -- dig it!

Chemistry

You're all shook up!
— Eleuthere Irenee du Pont?

Chemistry has its origins in both alchemy and medicine. Although the modern discipline has its basis in atomic theory with its attendant understanding of sub-atomic particles and bonding between elements, ancient Greek and Roman "chemists" knew and used a wide range of chemicals by means of trial and error. They experimented on their patients by prescribing on chemical after another until attaining desired results. As for categorizing chemicals, the ancient "chemists" described the elements in terms of taste, smell or touch.

In spite of the primitive nature of Graeco-Roman chemistry, J. G. Landels listed several practical triumphs in his *Engineering in the Ancient World*: cure some diseases, make palatable and potent wines, insure a healthy diet from limited food production and invent a lasting black glaze for their pottery.

Once John Dalton's experiments with various gases were published, modern chemical knowledge began to accelerate. One personality who had a significant effect on the future of chemistry was E.I. Du Pont, who founded the huge chemical company for the purpose of manufacturing black powder during the war of 1812. After his death, the company developed nitroglycerin, dynamite, heavy chemicals, acids, neoprene synthetic rubber, nitrocellulose plastics, nylon, electrochemicals and more.

Just as Du Pont's production of black powder was simply a stepping stone to future advances, the Chemistry advance in *Sid Meier's Civilization* is primarily a path to Refining and Explosives.

Playing Tip: Attaining the Chemistry advance enables you to get Refining and accelerate progress with cheap power (Power Plant) and Plastics (necessary for building "space ark" components). If you are in a wartime economy, you will want to get Combustion as soon as possible to move toward the versatile Rifleman unit.

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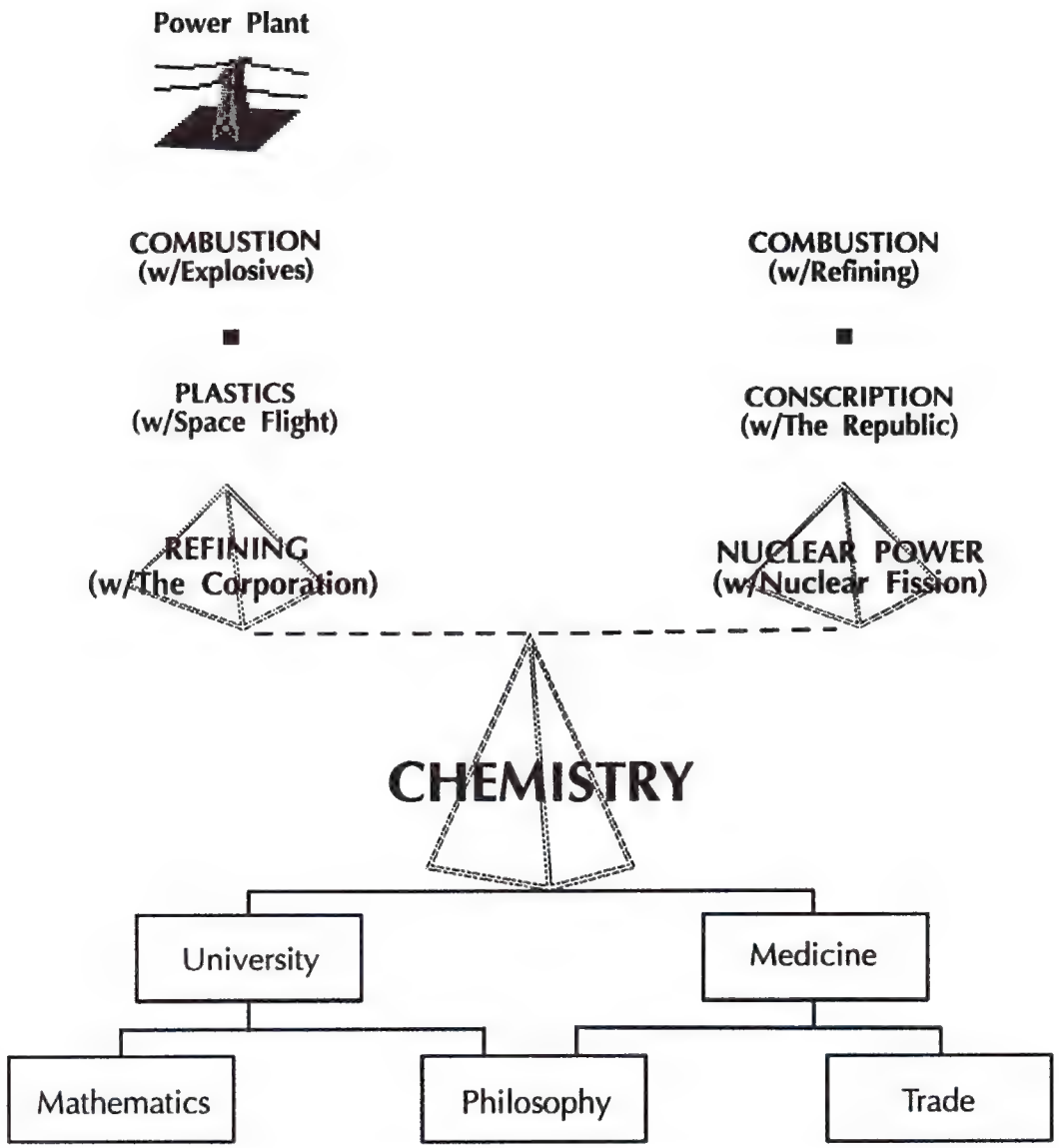

Chemistry is nothing but a way point to Refining (where Power Plants await eager industrialists) and Explosives (where it is usually a short hop to Conscription and those wonderful Riflemen units). Both of these Advances are required before a player can achieve the important advance of Combustion, which in turn moves a player toward the Automobile and the precious Armor units that discovery affords. If there are more pressing discoveries to be made for their immediate effect, Chemistry can often wait.

Chivalry

If I fight a dragon, you'll have to pay scale.
— St. George?

Chivalry is the romantic underpinning that galvanized young nobles into knighthood. At a time when poets were just beginning to write their verse in the common tongues, rather than the ecclesiastical Latin, they chose four types of representations of courtly love: epic poems of heroic prowess, lyric poems expressing human love, folktales expressing the marvels of the quest and the romance form itself with its emphasis on both hero and heroine. This emotional celebration of deeds and motives served to inspire young nobles to strive for the heroic.

As Richard Barber recounted in his *The Reign of Chivalry*, "In the same way that the tournament was a kind of artificial, sophisticated warfare, so the new romances were also artificial and sophisticated in their analysis of feeling." For those who needed to be motivated by devotion to God (or search for wealth), the Crusades offered an motivational underpinning for the spirit of knighthood.

In *Sid Meier's Civilization*, the Chivalry advance is strictly provided as a prerequisite for building Knight units. Since the ideals surrounding knighthood are strictly relevant to the medieval period, attaining the Chivalry advance is a technological *cul-de-sac*.

Playing Tip: Unless you are presently being besieged by a hostile civilization such that you need Knight units to defend your cities, it is probably advisable to forgo this advance and focus on advances with more future potential. After all, you don't want to waste resources on useless Crusades in the same way that many of the crown heads of Europe did during this period, do you?

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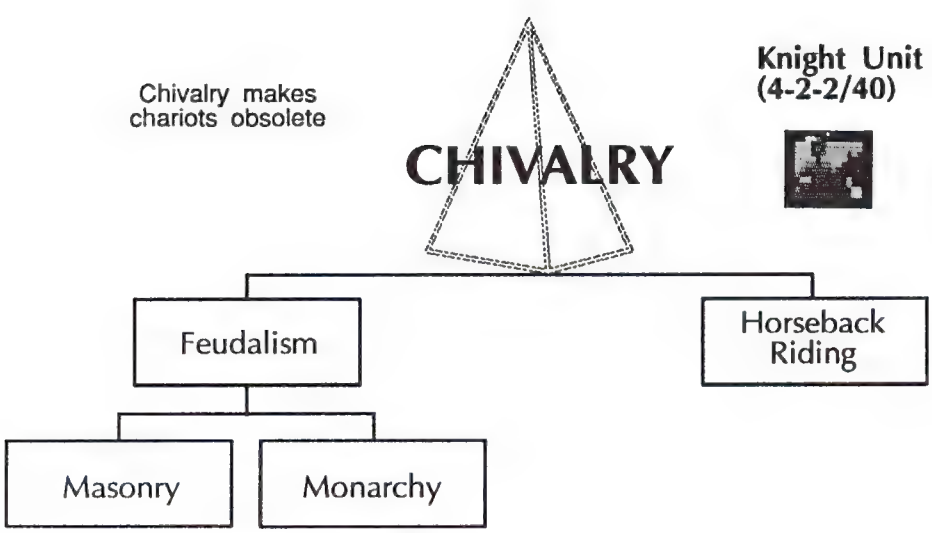


In Sid Meier's Civilization, Chivalry is NOT dead. In fact, it is a fine Advance if you are busy (or plan to be busy) conducting wars. The Knight units are the best all around pieces on the board until Gunpowder and Metallurgy render them ineffective (although they are not technically obsolete until the Automobile is discovered and Armor units can be built). Peacefully situated civilizations may not have a pressing need for Chivalry and Knights, but those engaged in wars may want to rush to make this discovery, even though it is a technological "dead end." The gauntlet lies before you...

Chivalry

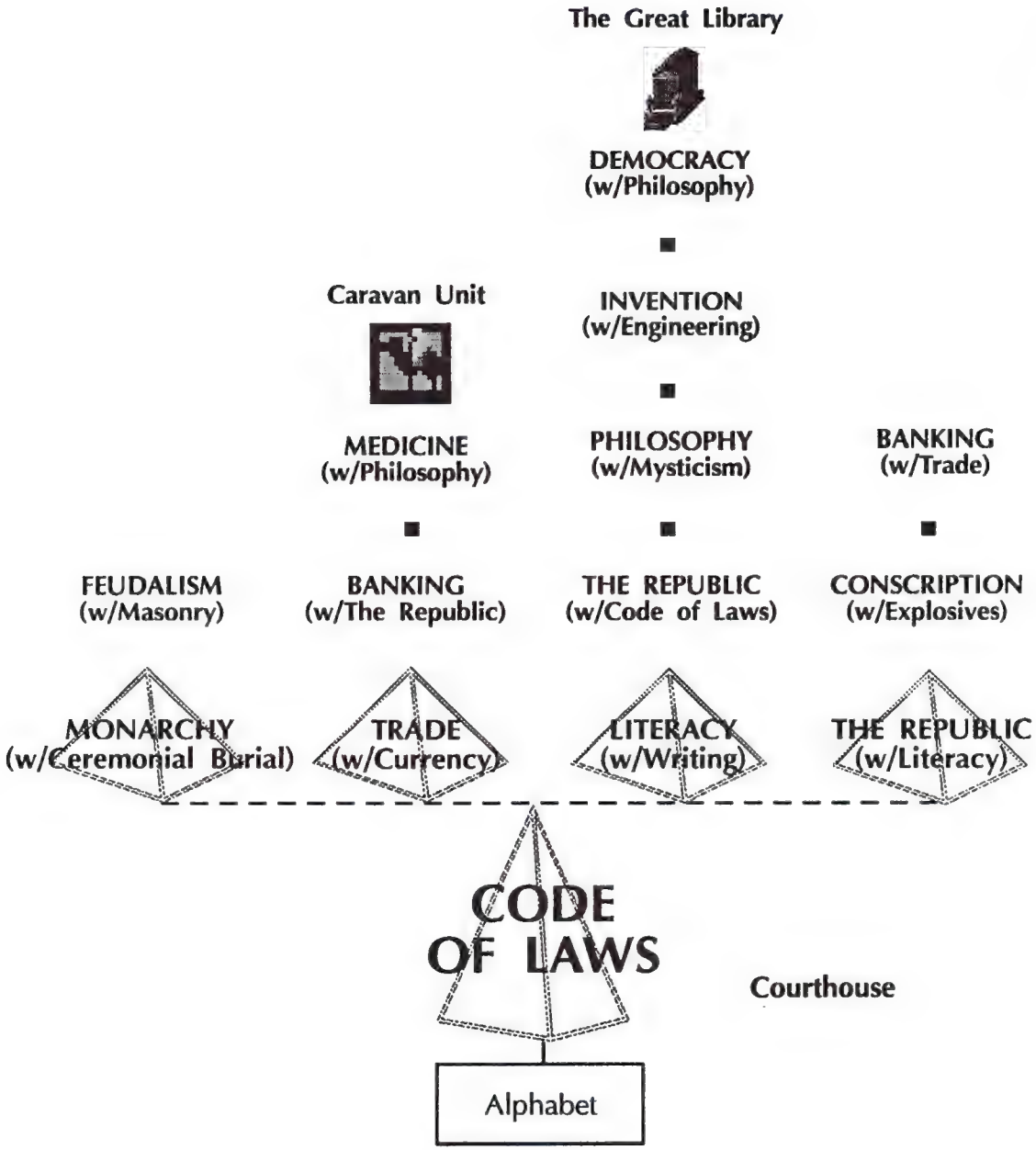
Code of Laws

I give up, why doesn't a shark bite a lawyer?
— Clarence Darrow?

A Code of Laws is a function of sociology. It indicates that a society has moved beyond the tribal or extended family where a person can take care of his/her own person and rights. In *Our Oriental Heritage,* Will Durant cited four stages in the development of law. The first stage in the development of law is this state of personal revenge where a person takes care of justice by themselves. The second stage was the substitution of material goods as damages. This imposition of damages was usually done by a chief. Later, in the third stage of the development of a legal system, tribal elders and solid citizens formed informal, usually voluntary, "courts." In ancient Hebrew society, for example, these courts were held in the open spaces between city gates. The fourth stage represents that phase where the state itself assumes the responsibility to punish wrongdoing and collect satisfaction.

Notice that even though development of an Alphabet is a prerequisite for establishing a Code of Laws in *Sid Meier's Civilization,* Literacy is not necessarily a requirement in the early stages of legal development. This is because there can be significant development based on an oral tradition before that tradition has to be preserved in writing. Fortunately, archaeology has uncovered tablets which reflect many ancient laws. In the ancient Middle East, for example, the Code of Hammurabi and the Nuzi Tablets are but two discoveries that add to our knowledge of early civilizations.

Playing Tip: The Code of Laws advance is not as important for the immediate advantage it provides (ability to construct a Courthouse) as it is for the gateways it throws wide. The most important of these gateways is probably Literacy, because it opens so many other vital pathways. Of course, if you are trying to chart a "get rich quick" course, you'll want to develop Trade right away in order to build those coin-conjuring Caravan units.



Code of Laws, like The Alphabet, Literacy and Philosophy, opens up a lot of doors. It allows players to build Courthouse improvements (although corruption will not usually be a problem for some time) and is one of the ingredients to four other important advances, most notably the new governments of Monarchy and The Republic. Unless you are in a "war" situation requiring the urgent researching of Bronze or Iron Working, etc., get your Code of Laws established as rapidly as possible (but make sure there are no ordinances against spending long hours playing computer games!).

Combustion

That just burns me up!
— Antoine-Laurent Lavoisier?

Combustion simply refers to the process in which the consumption of a substance, whether gas, solid or liquid, is accompanied by heat and possibly flame. Oxygen is usually involved in the combustion and was the first element isolated in the process. Early hints concerning the process were discovered by Otto von Guernicke (who invented the vehicle described under Automobile) and an English scientist named Robert Hooke. 100 years later (1772), Lavoisier discovered that the ashes of certain substances weighed more than the substances themselves. He believed the increased weight was caused by reacting with the air.

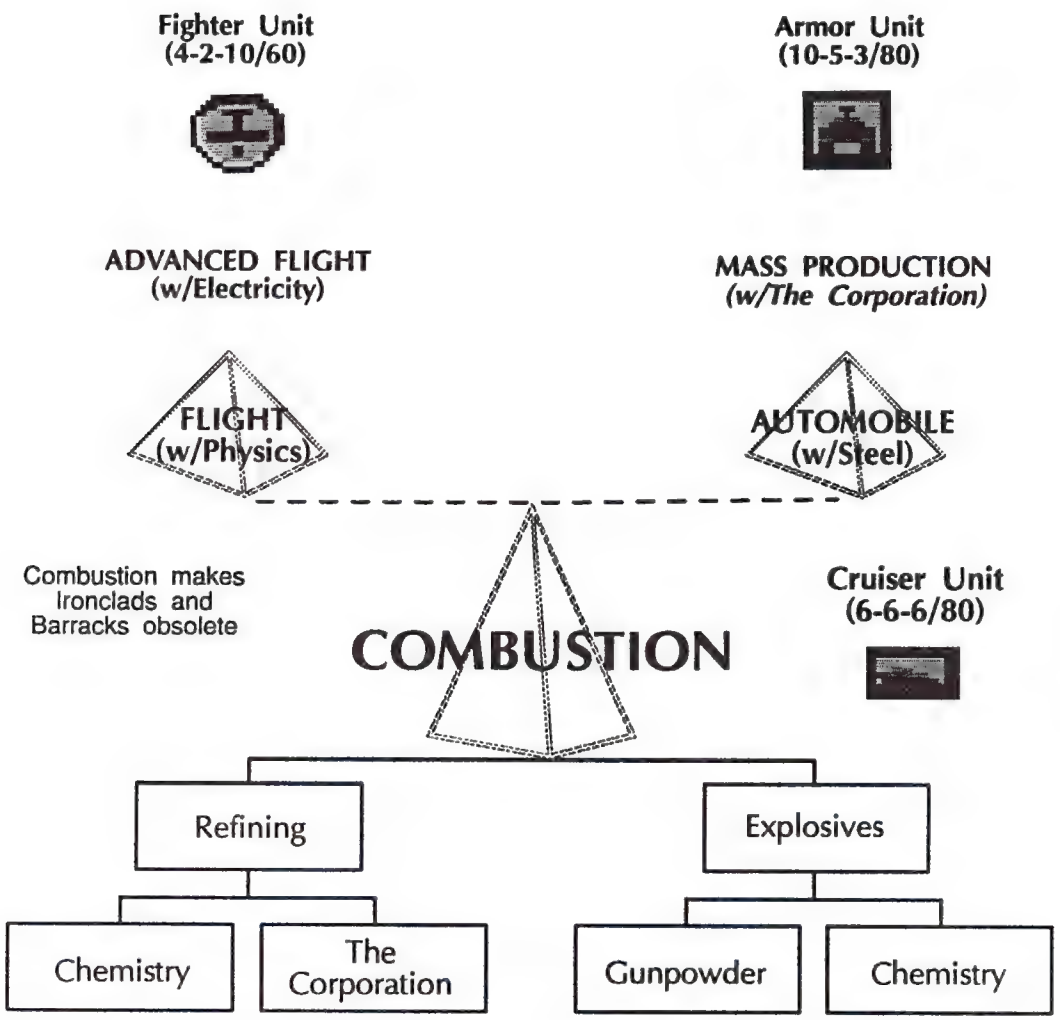
Such studies led to the table of the elements when John Dalton (see Chemistry) observed chemical reactions between gases. Then, the 19th century chemist, Sir Humphry Davy that observed differences in temperatures during various reactions and discovered the possibility of heat release without flame.

Today, it is recognized that combustion is the result of a substance in the proximity of oxygen or another fuel being ignited by heat, light or fire (from sparks to flame). In *Sid Meier's Civilization*, the Combustion discovery makes possible the internal combustion engine which powers the Automobile and the Flight of airplanes prior to the invention of the jet engine.

Combustion has one drawback. It means that you must immediately rebuild all of your barracks and maintain them at a higher price. However, it has many advantages whether you are at war or at peace. At war, you can immediately build and launch Cruiser units (tough, fast ships) and can get Flight and Automobile in order to get Fighter and Armor units respectively.

Playing Tip: If you are at war, move from Combustion to Automobile *first*. The Armor unit is worth more than the fighter. If you are at peace, reverse the order because you need Flight as a stepping stone to your space ark.

C



Two major Advances depend on Combustion: Flight (which leads to Fighter units and the entire space program) and the Automobile (with its Armor units). While the immediate effect of being able to build Cruisers is useful (particularly for examining unexplored oceans), the fact that Barracks become obsolete for the second time might cause you some consternation. Not only must they be rebuilt to maintain veteran forces, but their maintenance cost doubles to 2 coins per turn for the remainder of the game. Still, Flight and the Automobile are so important as to demand the speedy discovery of Combustion whenever possible, so hit the ignition.

GRAPHICS NOTE: New icons for Granaries, Marketplaces and Barracks (once rebuilt) will be seen in the View City display.

Combustion

Communism

The truth is, I wear red socks.

— Sen. Joseph McCarthy?

Communism is a political philosophy which grew out of class consciousness and class struggle. As a political system, it presented itself as a provisional government which was only supposed to be temporary. It was. For a more thorough discussion of Communism, see the discussion in Chapter 6. As a societal advance, you will probably only need Communism in order to: a) improve your war effort by making your government more efficient for military operations and to found the Labor Union movement in order to get the Mechanized Infantry unit; b) establish the United Nations wonder if you are either losing a military campaign against a stronger civilization or you are short on wonders; and c) if you don't have either the Pyramids wonder or Michelangelo's Chapel, since it makes their benefits obsolete.

Playing Tip: If you do not need to accomplish one of the three rationales described in the preceding paragraph, do not waste your time with this advance until you do.

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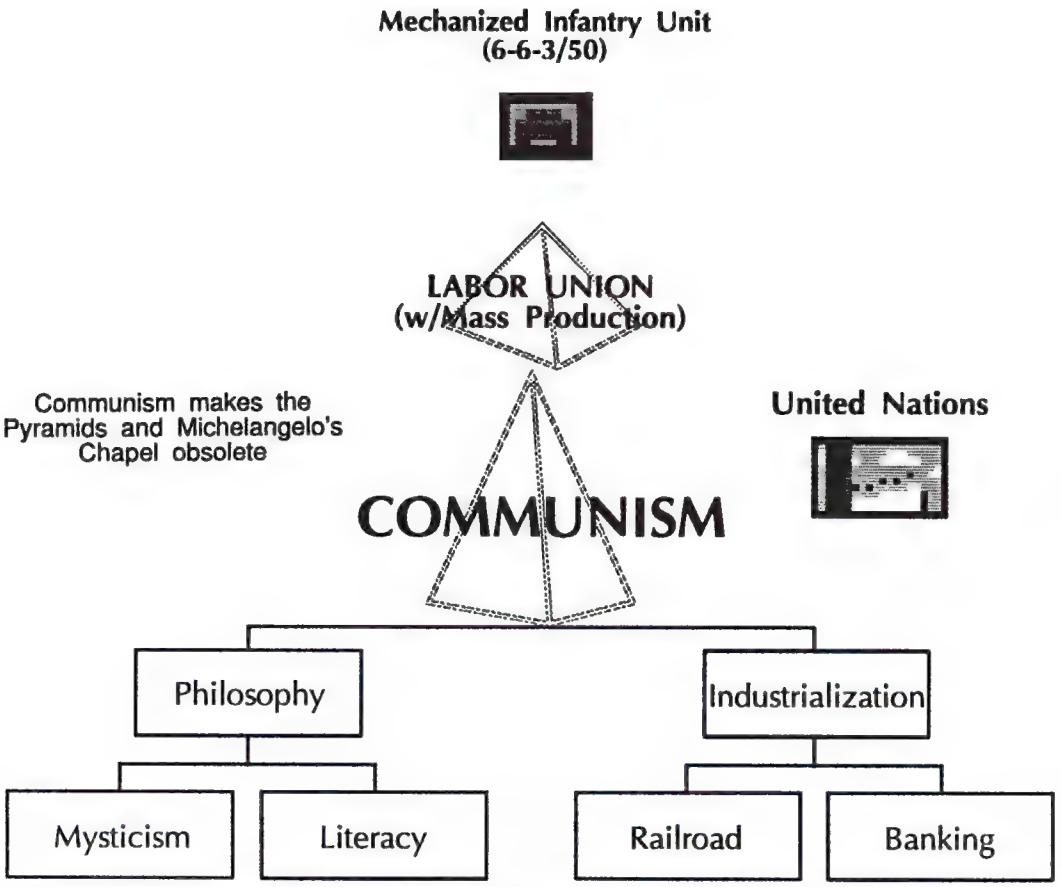


Communism (the "Monarchy for far flung empires") presents three possibilities. Primarily, the discovery of Communism will end the benefits of the Pyramids and Michelangelo's Chapel, which can be a useful "spoiler" if other civilizations possess these wonders. Additionally, if you have Communism, you can build the United Nations wonder (for 600 shileds) which works like the Great Wall, making every parley with another leader end in an offering of a peace treaty. Finally, Communism is one of the building blocks toward the Labor Union advance and the best defensive land unit in the game, Mechanized Infantry. Now if it were only a useful form of government in this game...

Computers

I can't do that, HAL.

— Dave?

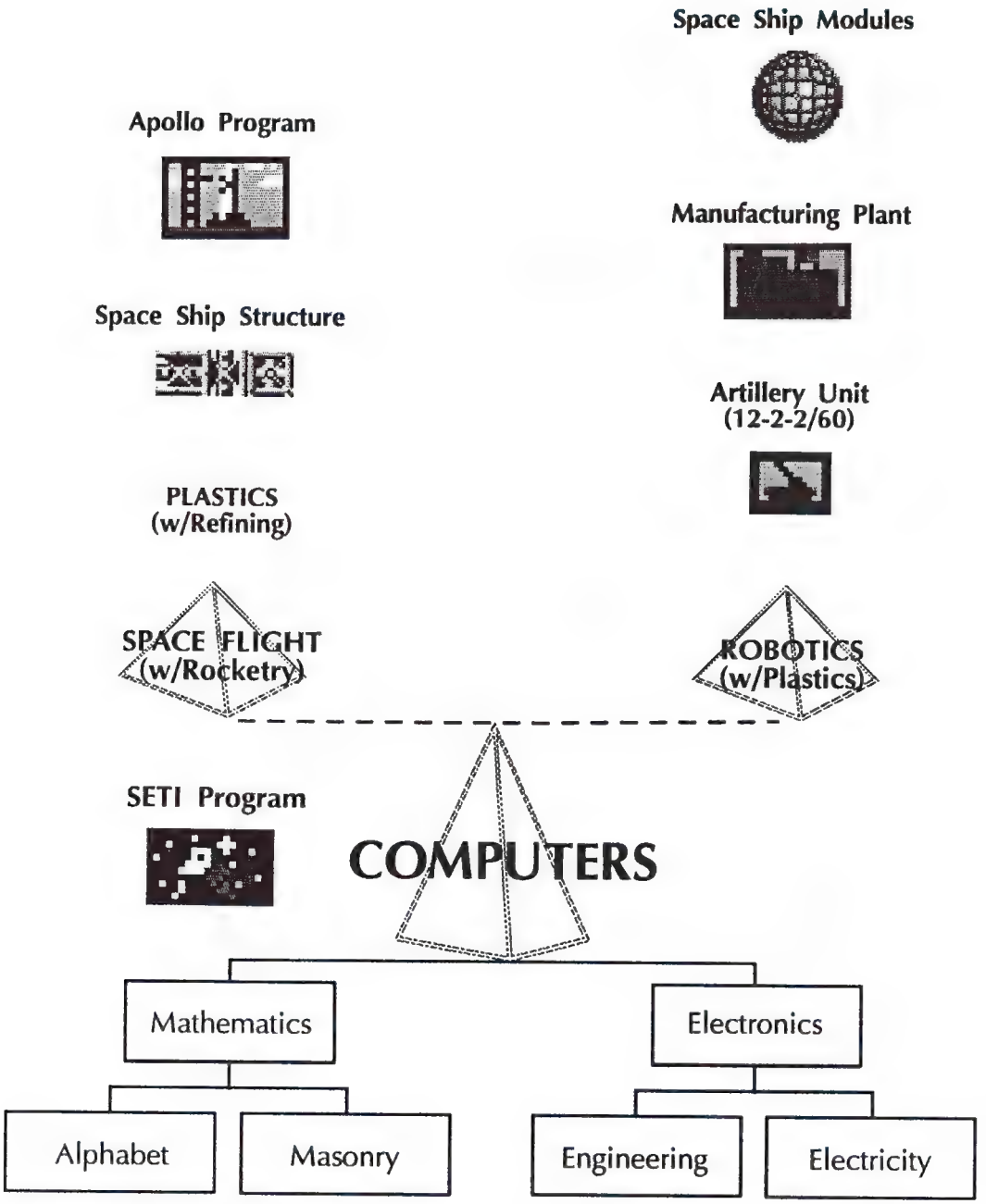
Although some might go back further, the modern history of computers began with John V. Atanasoff's digital computing device. Along with his assistant, Clifford Berry, he built the ABC (Atanasoff-Berry-Computer). In turn, the ABC inspired John W. Mauchly and J. Presper Eckert, Jr. to submit a proposal to the U. S. Army to develop an Electronic Difference Analyzer to make ballistics calculations. $400,000 later, Mauchly and Eckert presented the army with the ENIAC. The ENIAC was a full-scale computer which consisted of 18,000 vacuum tubes and 6,000 switches. By the time ENIAC was operational, however, the first two computers with storage for programs (EDVAC and EDSAC) were under development.

After the ENIAC became operational, Mauchly and Eckert formed their own company and sold the UNIVersal Automatic Computer (UNIVAC) to the Remington Rand corporation. When the U. S. Census Bureau purchased a UNIVAC from Rand, it sent a chilling signal to Thomas J. Watson, Sr., president of IBM. IBM was the vendor that supplied the census bureau with punch card machines. As a result of the threat from the UNIVAC, IBM built its first real computer, the Mark I. The rest, as they say, is history.

In *Sid Meier's Civilization*, the development of Computers allows players to establish the SETI Project wonder and significantly enhance the knowledge explosion, as well as discover Robotics and Space Flight. Both of these advances are absolutely necessary before you can move into the endgame.

Playing Tip: If you are not at war, you need to discover Computers as soon as they pop up on your menu. If you are at war, Computers can probably wait. They allow you to build Artillery units, but there are more valuable advances for crisis situations.

C



Computers are an important waypoint to a player's entire space program and, ultimately, Robotics (where Artillery units and Manufacturing Plants are a MAJOR reward). The SETI Program wonder, with its +50% gross light bulb production, while useful, arrives at a fairly late stage in the game after most of your discoveries have already been made. Still, every wonder is worth 20 Civilization Points and having the SETI Program makes the value of the additional 5 points scored for each "Futuristic Advance" far more attainable.

Computers

Conscription

This is just a first draft.

— Jacques, Comte de Guibert?

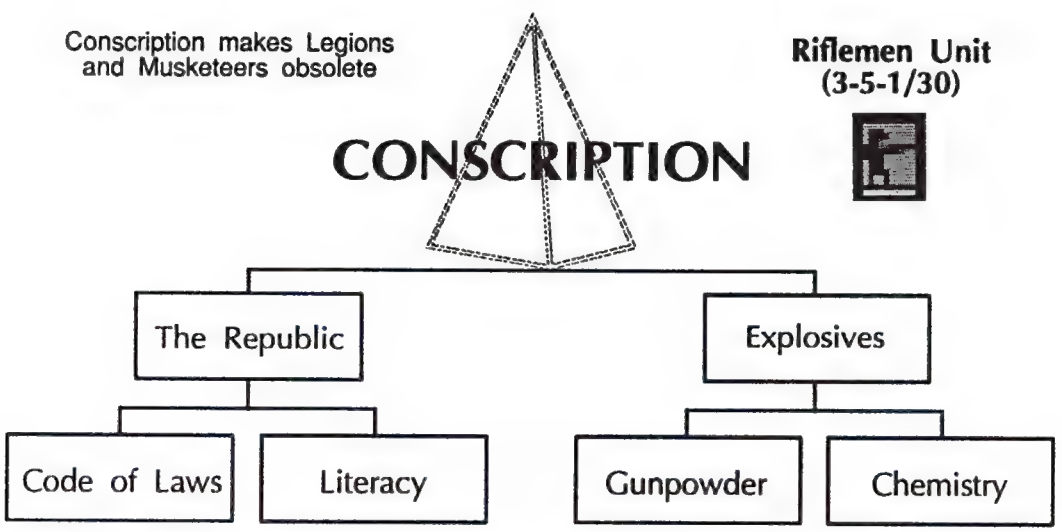
Although universal conscription, forced participation in a society's armed forces, appears to have been used in the Old Kingdom of Egypt (27th century B.C.), the modern use of the draft was not common until the time of Napoleon. Prior to the revolution, the Comte de Guibert had envisioned a massive deployment of ordinary citizens in his *Essay on Tactics*. (Guibert was not exactly an egalitarian, however, he still thought the army would need aristocrats to serve as officers.) Napoleon enacted universal conscription and, later, Prussia used a rotating conscription to train its entire male citizenry to face Napoleon.

In the United States, conscription occurred in both the North and the South during the War Between the States, but was not really used again until World War I. There was no draft after World War I until the U.S. entered World War II. After World War II, however, there was a peacetime draft until 1973 when the draft was discarded in favor of an all-volunteer army.

In *Sid Meier's Civilization*, there are no volunteers in the ranks of the Riflemen units. Since Riflemen units are excellent and inexpensive Garrison units, you would do well to establish Conscription when you need to shore up your civilization's defensive posture.

Playing Tip: Since Conscription is a cul-de-sac advance which does not lead to any further advances, you should only invest in this advance if you perceive your defenses weak and your future situation to be critical.

C



There is only one reason to discover Conscription, and that is to be allowed to purchase Riflemen units, the best military unit value in the game and a great boon for defense. If readying the defenses is not a priority, research elsewhere. (Remember, though, that you can never be too prepared for a sneak attack!). In the mean time, don't lose your draft card.

Construction

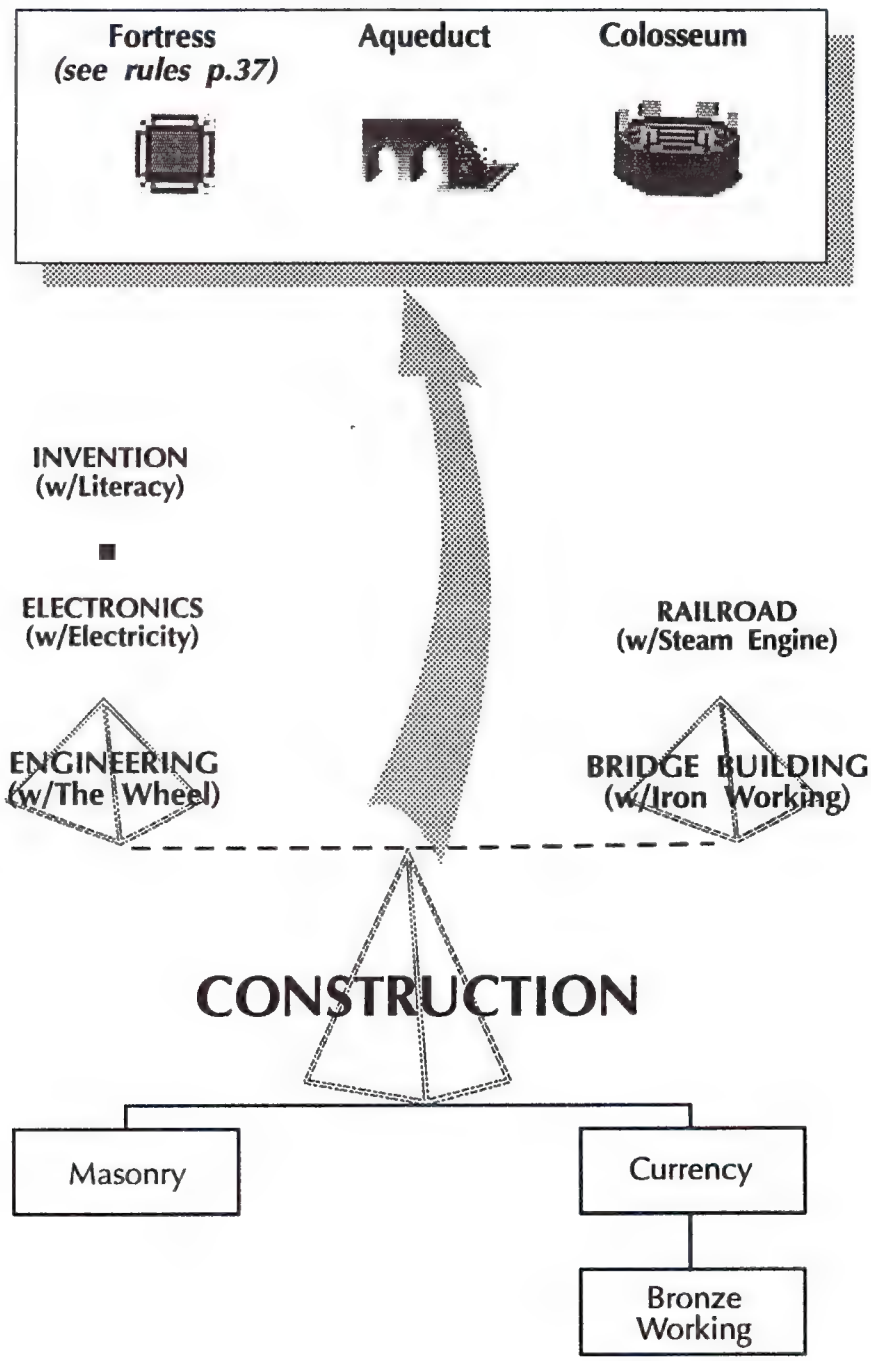
I'm taking a straw poll.

— Raamses I?

Construction is the art of building structures capable of housing individuals, families, governments and businesses. Early civilizations used the natural materials at their disposal, whether that meant the structures were built of reeds, bamboo, mud, logs or stone. As technology improved, the resources could be combined to make more impressive structures. For example, Egyptians discovered that mud mixed with straw made bricks which, in turn, made stronger walls than they had previously had in their mud huts; the Greeks discovered that fitting carefully hewn stones together prior to mortaring them together was more effective than simply using irregular stones joined with large portions of mortar and the Romans discovered that they could bind reeds together to create forms for curved ceilings, prior to finishing them with mortar and, oftimes, marble.

In *Sid Meier's Civilization*, Construction represents this latter era when the erection of structures is becoming more efficient. So, it is appropriate that the worth of Construction is primarily tied to benefits that assist your civilization in shifting from the early part of the game to the middle portion of the game. For example, you do not really need an Aqueduct improvement or a Colosseum improvement until one of your city's population is ready to move into double figures. A Fortress improvement is also available, but it is not useful enough by itself to warrant an early acquisition of Construction in and of itself. What Construction *does* accomplish is the transition toward an industrial civilization by preparing you for Bridge Building and Engineering.

Playing Tip: If your civilization has been immediately thrust into a wartime economy, you will want to wait on acquiring Construction skills. If you are largely at peace, however, early acquisition of Construction sends you up the evolutionary ladder of technology that much quicker.



Construction doesn't seem to get a lot of respect until after "something happens." After a city is denied growth from 10 to 11, or when the unrest in a city becomes too acute to ignore any longer, only then do players seem to value Construction and the Aqueduct and Colosseum improvements which it allows. While Fortress construction is seldom critical in any game, Construction does put the player on the fast track to both Bridge Building (to improve your defensive road network) and Engineering (which is a key to Gunpowder). Try to show some forethought when timing the research of Construction, rather than leaving it as an embarassing afterthought.

Currency

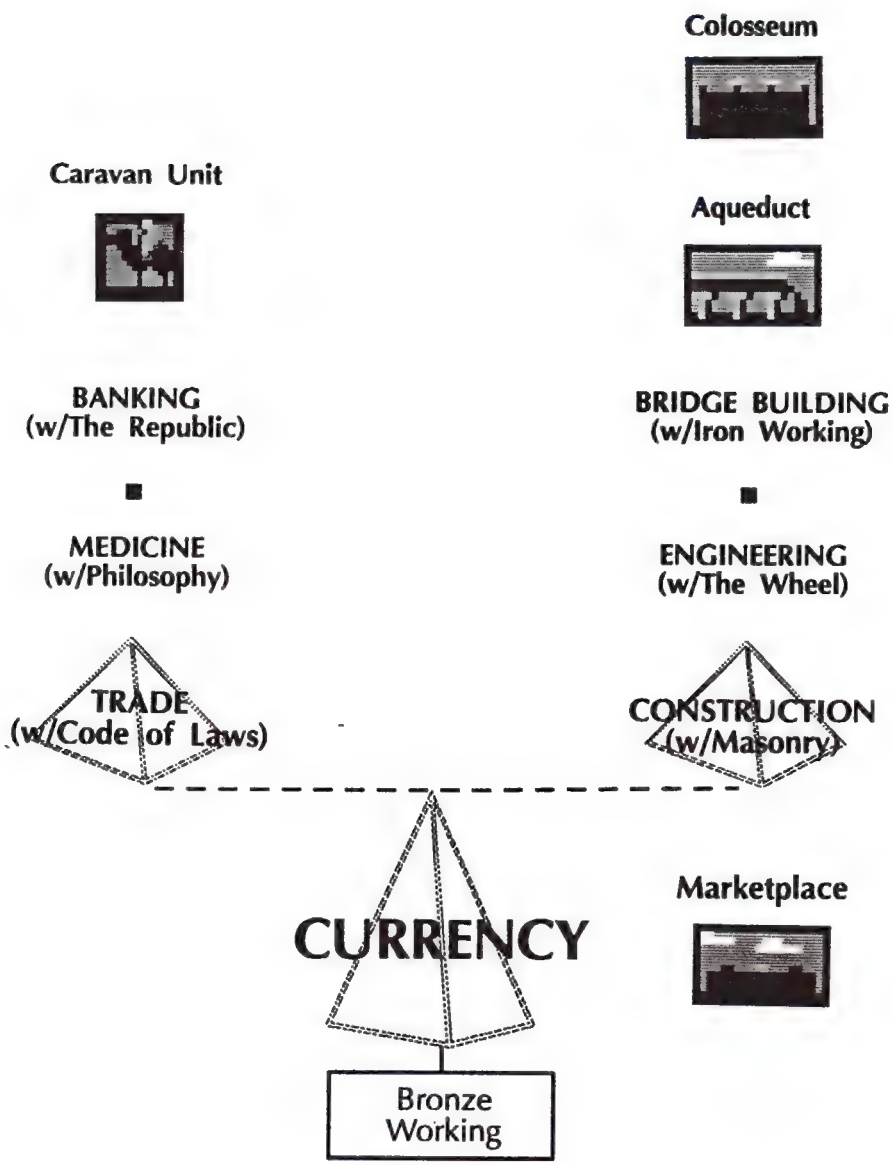
Casting bread on the waters lowers the resale value.
— Chicago Board of Trade?

Currency is, primarily, a promise to provide value. The use of currency represents a transition from a barter economy (where one item of necessity or value is traded directly for another item of necessity or value) to a market economy (where all items are compared in value to some common standard). Although coins have existed for millenia and promissory notes and checks (ancestors to paper currency) have existed since ancient Babylon and Alexandria (see the section on Banking, earlier in this chapter), currency has not always been coinage or paper money. In some African civilizations, salt served as a medium of exchange. In classical Greece, Homer described shields in terms of oxen. In ancient Rome, money was called *pecunia*, a term which bespoke wealth in terms of a head of cattle (*pecus*).

In *Sid Meier's Civilization*, Currency represents the move to a market economy, as well. It allows your civilization to move on to the Trade advance (and Banking), as well as allowing for the types of Engineering advances which lead toward Industrialization.

Playing Tip: You will not need Currency as one of your first few civilization advances, but you should be thinking about acquiring the advance just before you are ready to shift into the middle portion of the game. At that point, you should write down the advances and the order you will need to achieve them to reach Industrialization as swiftly as possible. Then, focus on that handwritten development plan unless you are attacked by a rival civilization that poses a viable threat.

C



"Money makes the world go around," the song says. The Currency advance is where building a civilization's fiscal picture really begins. With a Marketplace improvement, a city will generate 50% more coins and luxuries, which will help optimize their production. Currency is also a building block toward the Trade advance (with its precious Caravan units) and Construction (where Aqueducts and Colosseums will keep cities happy and growing). While seldom urgent, Currency is a good Advance to research when not beseiged by more pressing demands. Remember, it helps to invent cash so that you can improve your cashflow.

Currency

Democracy

One man, one vote! It doesn't say they have to be alive!
— Boss Tweed?

Democracy is the highest form of representative government. For a brief synopsis of the history and effect of Democracy in *Sid Meier's Civilization*, see the section on democracy in Chapter 6.

Playing Tip: Democracy is an advance that is best left until that portion of the game where you have no hostile neighbor that is viable enough to mount a serious attack and you are ready to move toward the endgame and the race toward Alpha Centauri. When you are ready to implement Democracy, be certain to make a complete survey of every city in your civilization and determine that there is a sufficient sense of well-being to allow you to implement this form of government.

D

Recycling Center

RECYCLING
(w/Mass Production)

DEMOCRACY

Philosophy

Literacy

Mysticism

Literacy

Writing

Code of Laws

Winston Churchill aptly described democracy as "the worst form of government, except for all others." It is the highest level which a civilization can achieve and eliminates all corruption. Unfortunately, city unrest must be watched diligently, for the state of Anarchy following the overthrow of a Democratic government is twice as long (2-8 turns) as the others and the double "sad faces" created when troops are mobilized makes Democracy a terrible "war" government. You should only rush the discovery of Democracy when the borders are secure, the prospects for continued peace are promising and there are no large expeditions off abroad.

Democracy

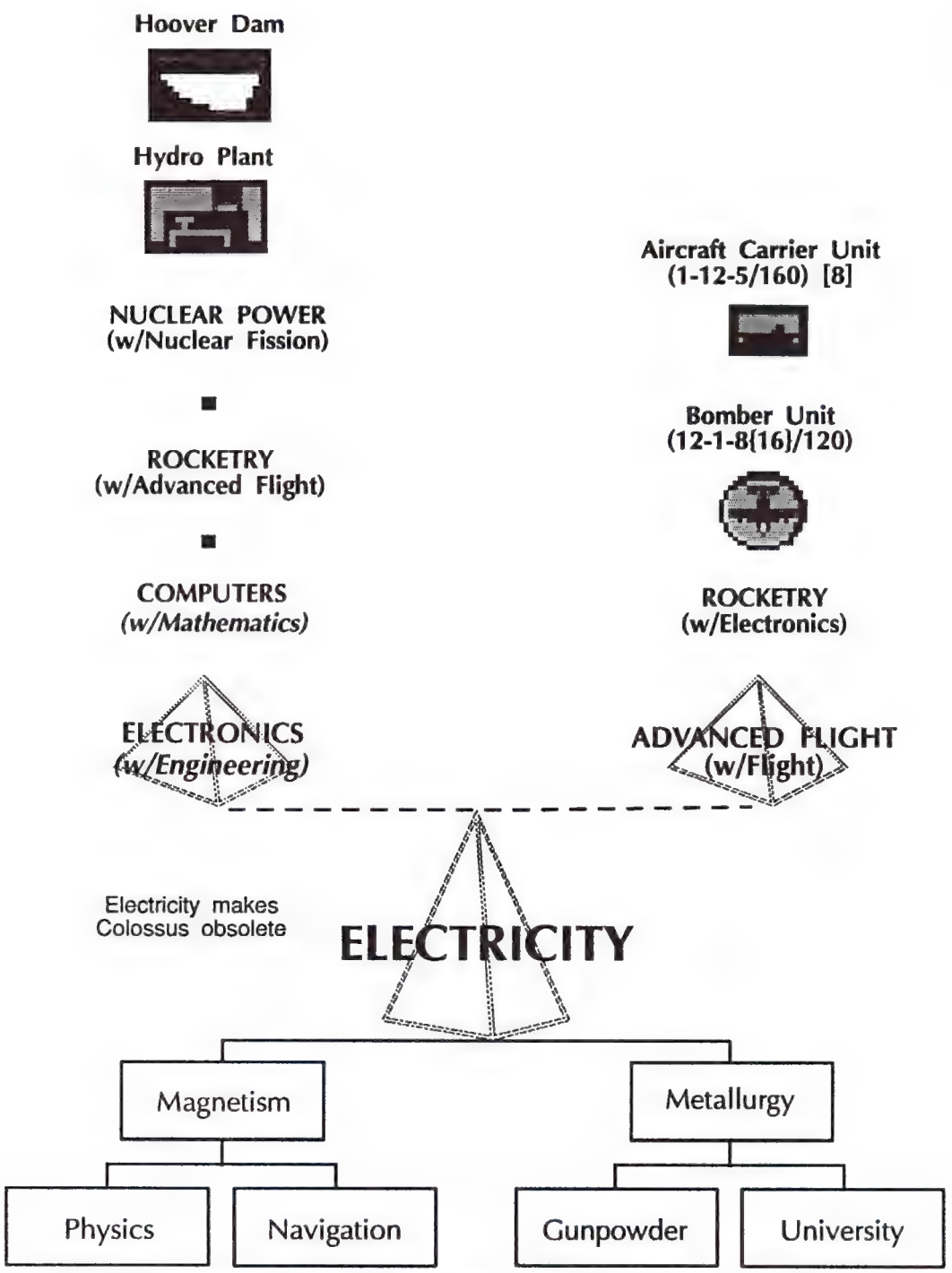
Electricity

I'm either kiting hot checks or making a key discovery.
— Ben Franklin?

As suggested by the "Pyramid of Progress" on the opposite page, the modern understanding of electricity comes directly from the observations of magnetism. In the late 16th and early 17th centuries, William Gilbert referred to the charged up force caused by the friction between two objects as being "electric." 100 years later, a Frenchman named Dufay delineated the cause of this "electricity" as coming from the interaction of two different forces. One force he described as "attractive" and the other he described as "repulsive." Later, Benjamin Franklin standardized the notation concerning these forces into plus (+) and minus (-), as well as suggesting that there had to be a conductor before objects could be electrified. Joseph Priestley proved this in 1767.

By the 19th century, Sir Humphry Davy's assistant, Michael Farraday was ready to prove that electricity could be discharged into the air and managed to build a new theory of electricity, complete with terms which are familiar in the modern world (i.e. electrode, cathode, electrolysis, etc.).

Playing Tip: When you sense that you are ready to move into the endgame, you will need to settle all your wars and select Electricity as a stepping stone toward Electronics and, eventually, Space Flight. If your civilization has the Colossus, make certain that you can afford to lose the trade bonuses associated with that wonder prior to your civilization's discovery of Electricity.



Ironically, as an Advance, Electricity just doesn't have a lot of spark. While it can quickly take a player to Electronics (which is nice for its Hoover Dam wonder) and from there to Computers, these examples only serve to underscore that there is no real immediate benefit from discovering Electricity. With apologies to Benjamin Franklin, except for shutting down an opponent's Colossus wonder, a player would be better off flying a kite in the rain than rushing off toward the discovery of Electricity.

GRAPHICS NOTE: The scientist who announces each new Advance (that's designer Sid Meier, by the way) now wears his modern lab coat garb.

Electronics

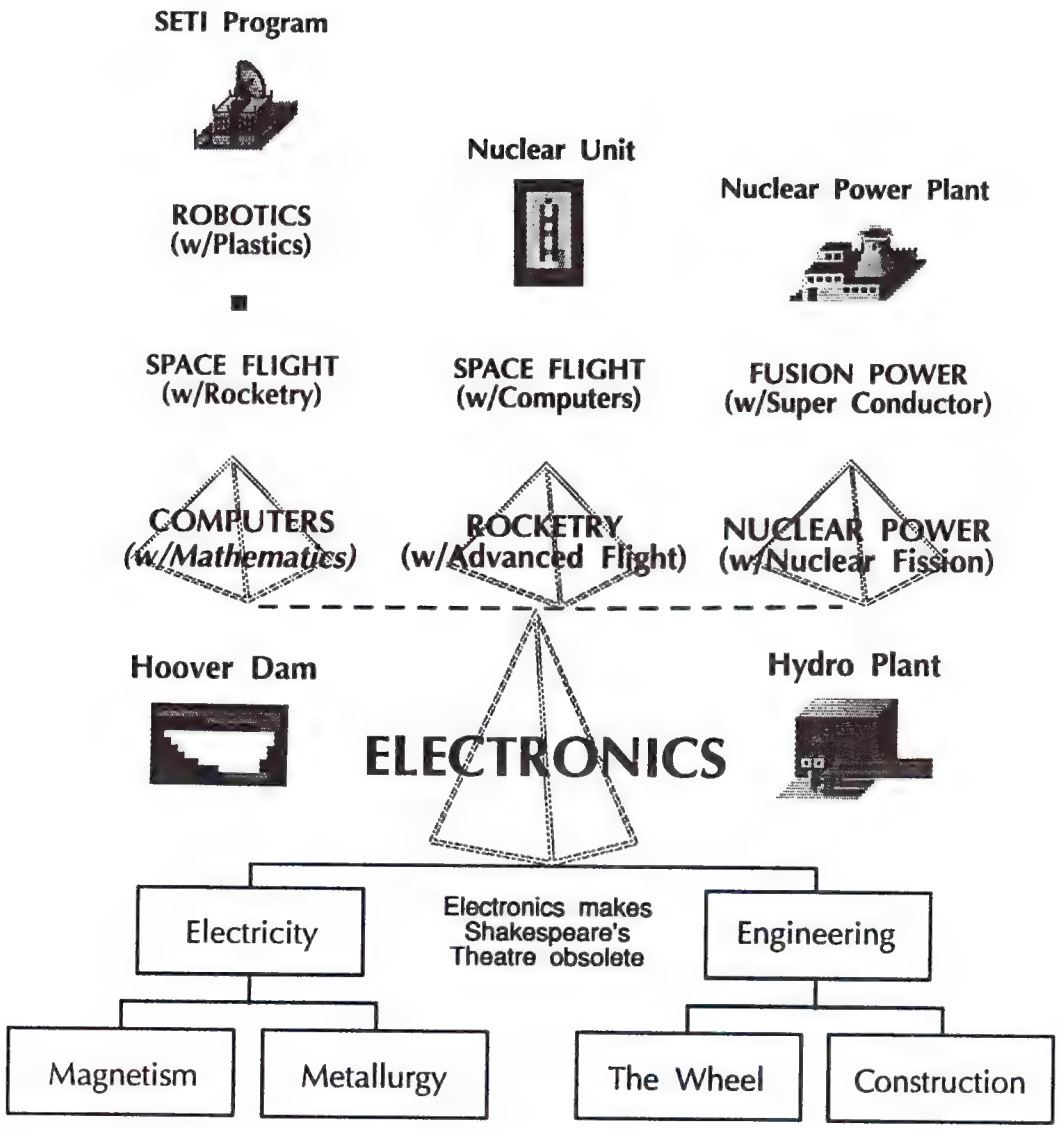
This cathode is terminal.

— Thomas A. Edison

Thomas Alva Edison built on the early discoveries of Electricity and invented an electric light. As he observed that light, he noticed a bluish glow between the filaments which he could not explain. A British physicist named J. J. Thompson determined that the so-called "Edison effect" was due to electrons leaving the cathode (negative terminal) and moving to the positive terminal of the filament. Another British scientist, Sir John A. Fleming, managed to put this effect to work by building a vacuum tube so that he could receive radio waves via the "Edison effect." Fleming's effort was refined by an American named Lee De Forest in 1907. The American added a third electrode to amplify the radio waves and the invention led to broadcast radio in the 1920s and to Vladimir Zworykin's invention of the iconoscope, a variation which made broadcast television possible.

The field of electronics expanded rapidly from the crude implementation of vacuum tubes through the eventual use of transistors, semiconductors and integrated circuits. In *Sid Meier's Civilization* this rapid advance of technology allows players to pick up several important advances (Computers, Rocketry, Nuclear Power), a valuable wonder (Hoover Dam) or a useful improvement (hydroelectric plants).

Playing Tip: Once you have discovered Electricity, you are committed to a race into space. Therefore, you should immediately select Electronics upon acquiring Electricity. Once you obtain Electronics, you should immediately select a city that is well-defended and located on your largest, most-populated continent. That should be the site of the Hoover Dam wonder. At the same time, you should build Computers, Rocketry and Space Flight and Nuclear Power in order to keep on target for that space ark.



After the discovery of Electricity, you should quickly follow up with the discovery of Electronics since both the Hoover Dam wonder and the Hydro Plant improvement are excellent purchases. Not only do Hydro Plants and the Hoover Dam provide 50% more shields to a city which also has either a Factory or Manufacturing Center, but they also reduce the industrial side of the pollution formula by an impressive 50%. Combine this with the many high tech advances it opens up, and Electronics can clearly been seen as a player's portal to winning the end game. Microchips, Ho!

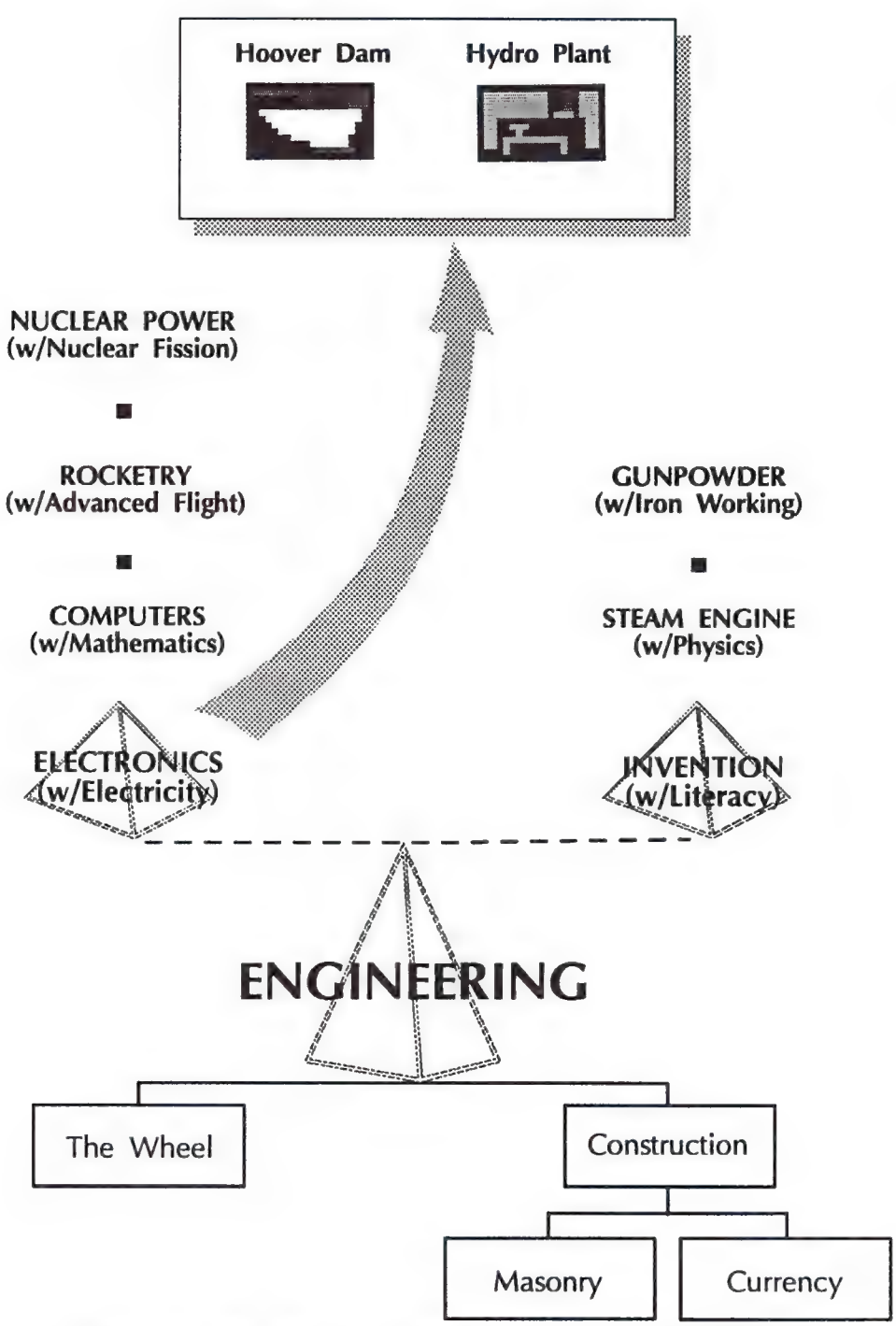
Engineering

It's a perpetual motion machine.
— Hero, The Mechanical Man

Engineering comes from the same Latin root from which we get the word, "ingenius." The Latin verb is *ingenuare* and it simply means, "to create." So, in its broadest sense, the science of engineering means creating new or more efficient uses for limited resources. Some well-known engineers in history include Hero of Alexandria (The Mechanical Man), Vitruvius and Frontinus. Hero wrote on everything from inventions that used siphons, steam pressure and compressed air to the structure of puppets (hence, his nickname). Vitruvius was best known for his *De Architectura*, ten books that took architecture from the design phase all the way through to the mechanical pumps and gadgets that could improve the living conditions inside the buildings. Sextus Julius Frontinus specialized in water projects. As noted in *Sid Meier's Civilization*, it is this ancient science that allows the more modern paths of Industrialization and Space Flight to develop.

Naturally, you will have to follow the Industrialization path initially, because that is the only way you are going to be able to get Electricity and move onto the Electronics path (which leads to Space Flight). You will have to get Engineering in order to win, so keep it in mind for those times when you are not being invaded and are not off conquering other civilizations.

Playing Tip: While Engineering should be selected in the early portion of the game and has to be acquired before you can reach the middle portion of the game (Industrialization), it should not be one of the first handfuls of advances selected, since it offers no immediate advantages. Don't forget it, though. You'll have to have it eventually.



Engineering, of itself, offers very little as an Advance. The pursuit of Electronics will be waiting quite a while until the discovery of Electricity. However, Invention looks much more promising. Invention is the key to Gunpowder (and a new age of military technologies) and the Steam Engine (which leads to the Railroad and the age of Industrialization). If another Advance is not pressing, you should beam up with Scotty and check out Engineering.

Explosives

Gentlemen, I think I blew it!

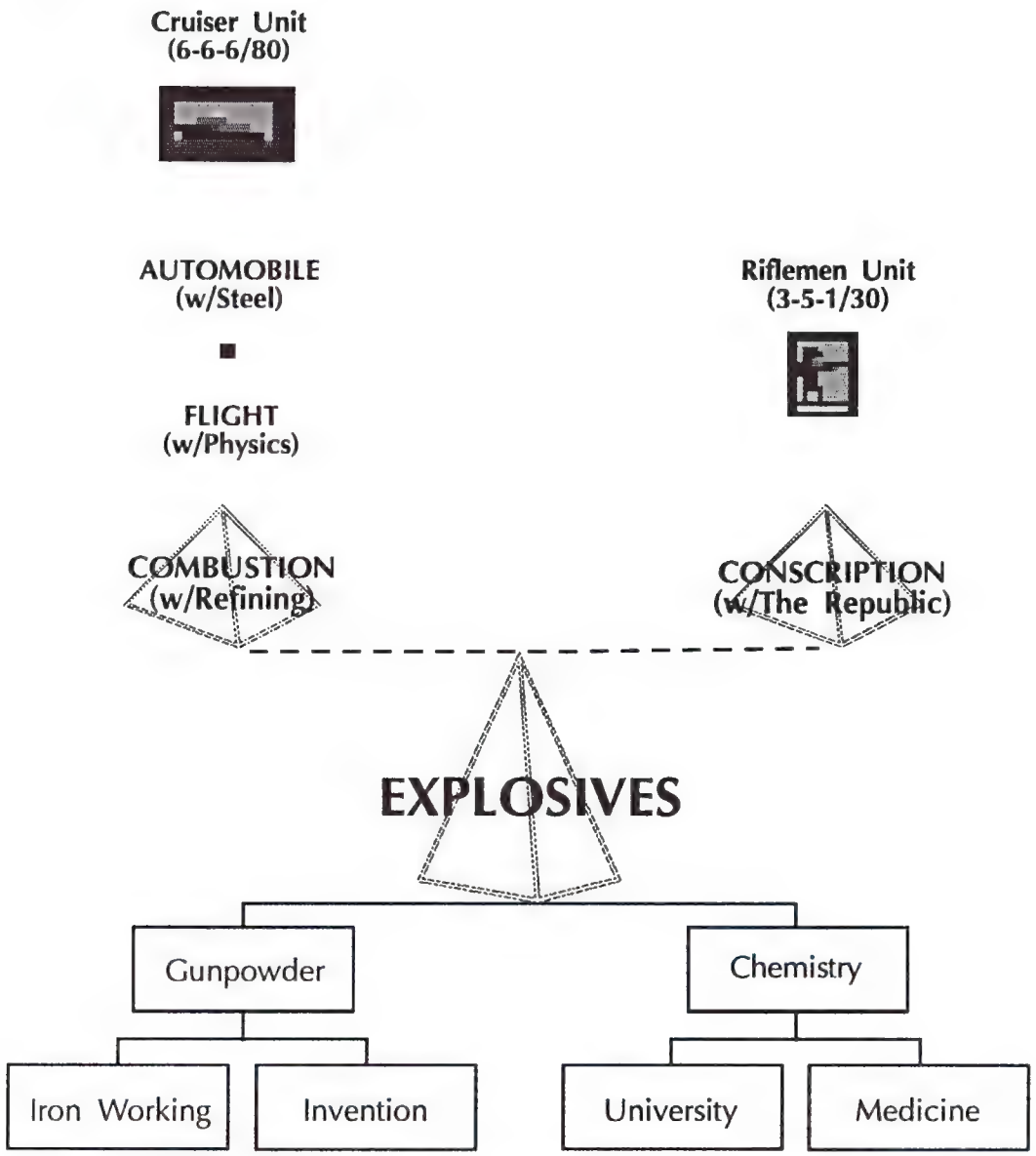
— Alfred Nobel?

The first explosive was a mixture of potassium nitrate, sulfur and carbon called (due to its coloration) black powder. The Chinese used it from the 10th century B. C. onward in fireworks and signals, but the Arabs also discovered the powder during an early era. In fact, Arabs are reputed to have used black powder to fire arrows out of bamboo tubes reinforced with iron prior to 1300 B. C.

Black powder was the dominant explosive until the 19th century when Alfred Nobel commercialized the manufacture of nitroglycerin (in spite of his younger brother's death in a laboratory accident) and shortly thereafter, invented dynamite. By the turn of the century, however, military forces were looking for more stable explosives for field purposes. As a result, TNT and picric acid came to be used during World War I, while plastic explosives and shaped charges came to be used during World War II.

For all the destructive power of explosives, the Explosives advance in *Sid Meier's Civilization* offers no new weapons for the nation at war and no new improvements for the nation at peace. The Explosives advance is a necessary hurdle on the way to Combustion and its eventual pay-off in Flight and Automobile, as well as Cruiser units, or Conscription with its quick pay-off in Riflemen units.

Playing Tip: Never simply select the Explosives advance. It should only be selected when it is part of the path for a direction in which you are already headed.



Explosives is another of the many intermediate discoveries which reap the player no immediate benefit. While Combustion is usually still a ways off due to the need for Refining, Conscription is often right at hand. If you are under attack (or you are busy preparing to BE attacked, like a good paranoid), the defensive advantages of these inexpensive Riflemen units might be worth a fast dash through Explosives to get. Otherwise, you may well do better to pursue other Advances which offer more immediate rewards.

Feudalism

To knight's the knight.
— Guinevere?

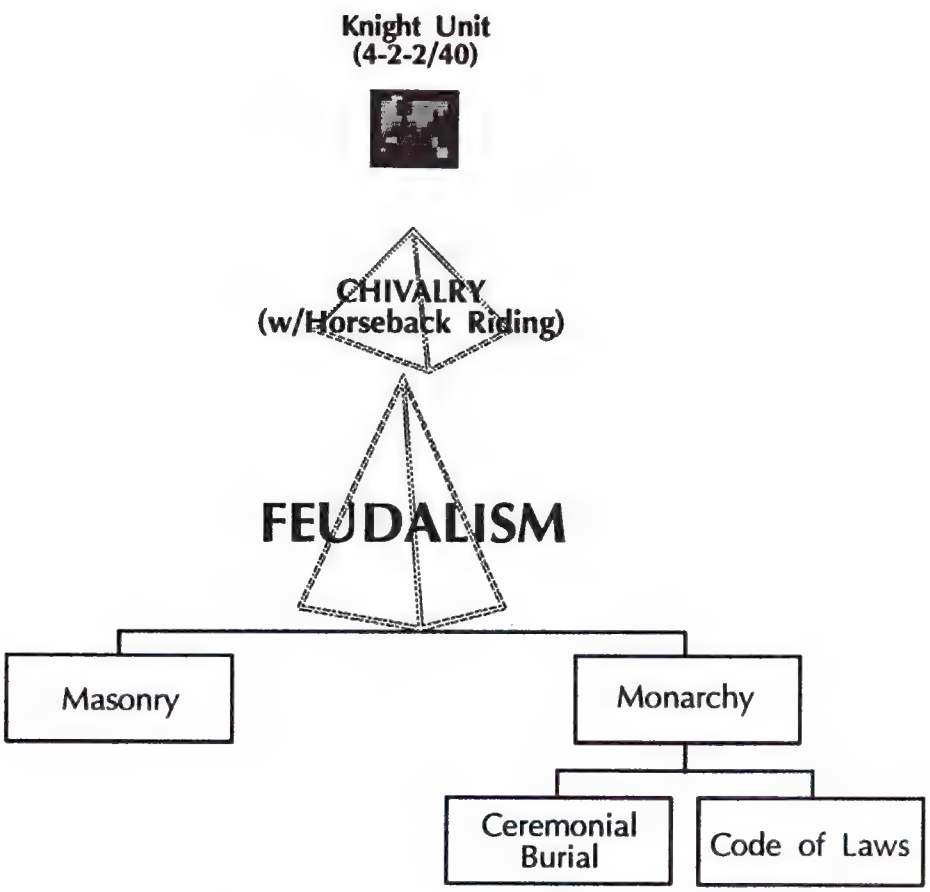
Feudalism, as H. G. Wells noted in his *Outline of History*, was a perfect example of private law filling the vacuum when public law failed. In the breakdown of central powers in Europe, he perceived two forces at work. On one side, there were those who simply wanted to band together for economic security and protection. On the other side were those who believed in the chivalric ideal (see the discussion on Chivalry in this chapter).

The result of the privatization of a larger state's responsibilities is that all of Europe was divided into small bailiwicks ruled by local "lords." In return for a fief, which could be anything from a piece of land to the right to collect tolls or operate a business, the recipient would place his hands in between the hands of his would-be liege-lord and swear fealty to the liege-lord. The vassal thereby pledging unspecified service and loyalty as the liege-lord pledges unspecified protection.

The major benefit of Feudalism in *Sid Meier's Civilization* is the fact that you can then develop Chivalry and, as a result, build Knight units. As you can see from the "Pyramid of Progress" on the right-hand page, this leads to a technological cul-de-sac.

Playing Tip: This is an ideal advance to seek if you are forced into early hostilities. If not, you are certainly better off selecting advances that protract into a significantly longer line of advanced technologies.

F



There is one, and only one, reason to pursue Feudalism; in order to move quickly to Chivalry so that the fine Knight units can be purchased. Knights will dominate the battlefield for a long time (until the advent of Gunpowder). If you are caught up in the ancient-to-medieval arms race, you might be pressed into Feudalism's rapid discovery. If things are looking peaceful, however (i.e., the wars have been short or you've got the Great Wall wonder), Feudalism is futile and can easily wait.

Feudalism

Flight

What fare should we charge to fly 852 feet?
— Orville Wright?

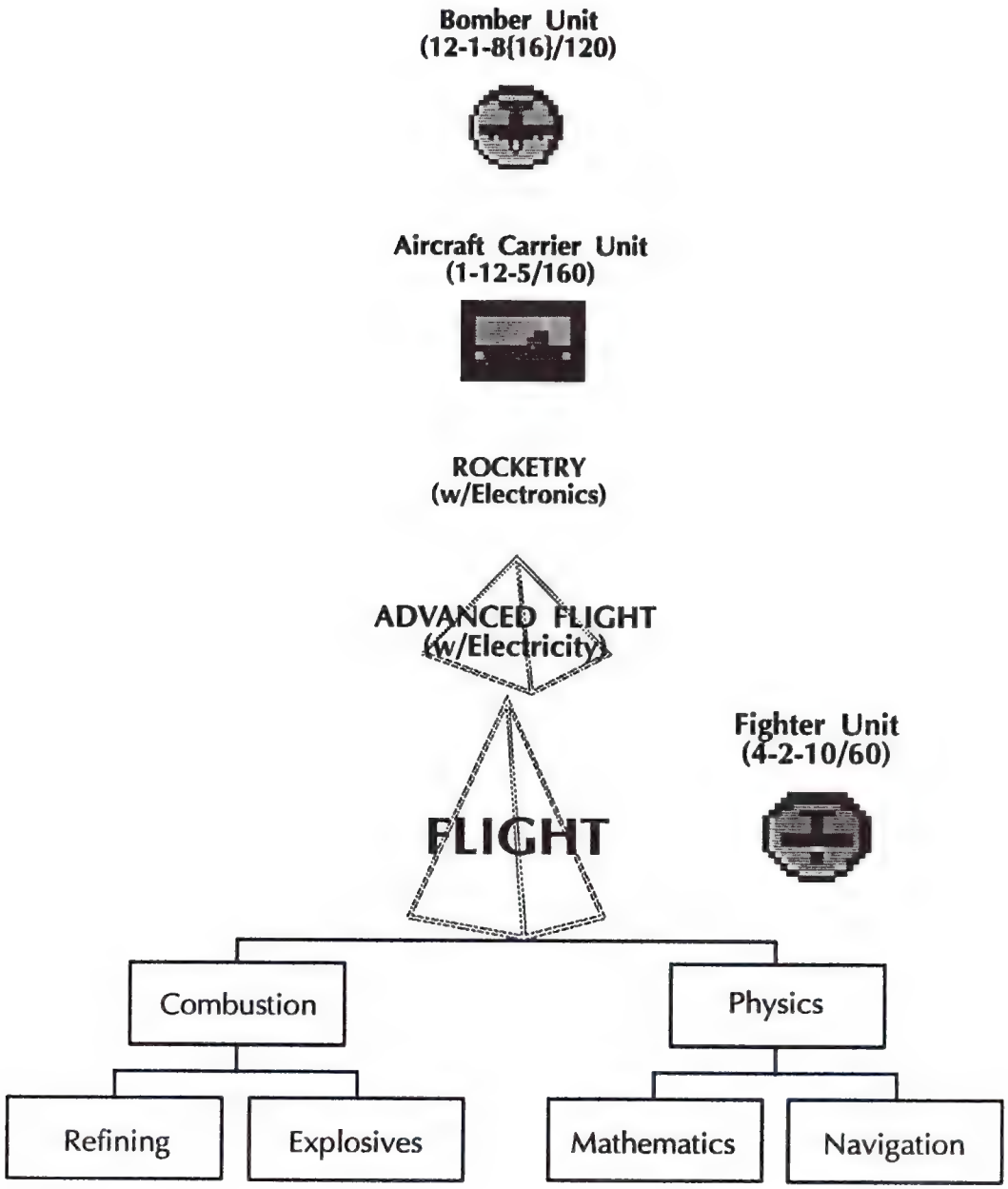
On December 14, 1903, a new era in transportation began. Wilbur Wright won the coin toss with his brother Orville that allowed him to pilot the first practical powered flight. Unlike other inventors who merely designed their flying machines and tried to fly, Orville and Wilbur started with kites, moved to gliders and finally, with the lessons they had learned from the final glider, redesigned the plane to aceept an engine. Their flight lasted 59 seconds and travelled 852 feet.

The Wrights summarized the problems facing early airplane builders as: a) problems related to sustainable wings; b) difficulties related to the engine; and c) the challenge of actually balancing and steering the machine while it was in flight. The inventors *did* manage to solve the problems, though. By the end of the 20th century's first decade, Glenn Curtiss (the Wright's most hostile rival and constant litigant in patent cases) was working on a seaplane for the U. S. Navy and Igo Sikorsky was flying his early attempts at helicopter flight.

In *Sid Meier's Civilization*, Flight represents the history of aviation up until the development of jet aircraft. Flight is a necessary advance for every civilization that expects to reach Alpha Centauri.

Playing Tip: If you are engaged in an offensive campaign against another player, you will receive an immediate benefit from the Flight advance. That is, you can build Fighter units (see the important notes on the right hand page). They are not very useful for defense, however. The important fact is that you should invent Flight as early as possible to keep on the Space Flight track (which is vital to victory).

F



The first step down the road to colonizing Alpha Centauri is Flight (which then proceeds through Advanced Flight and Rocketry to Space Flight). The immediate benefit of Flight is, of course, the Fighter unit. It is interesting to note that Fighters were "upgunned" during the final playtest stages of the game, and they posses a 4 Attack and 2 Defense Strength, not the 3 and 3 values indicated in the rules book. This allows them to attack ground units a bit better and defend their cities a bit worse. While Fighters might take a while to reach the "front," they're awfully handy once they get there. Take off, eh?

Fusion Power

What good is confusion power?

— Albert Einstein?

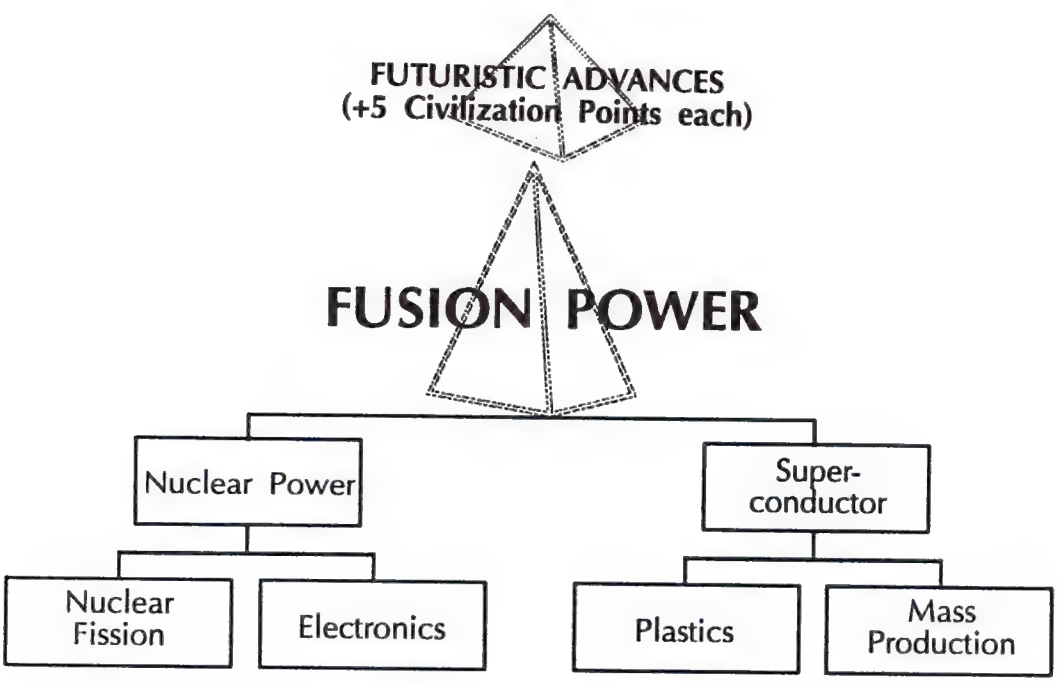
In nuclear fusion, the nucleus of a new atom is formed by joining two nuclei from atoms with light mass. Einstein believed that this would generate a tremendous amount of *inexhaustable* power. Modern physics has observed that the Sun and most stars generate their energy by a series of thermonuclear reactions. Therefore, they reason, science should be able to harness thermonuclear reactions as an industrial energy. Currently, research is focused upon thermonuclear reactions as they appear in plasma, the chemical state where matter is heated to the point that you can clearly distinguish between the flow of electrons and the unadorned atomic nuclei.

Nuclear Fusion as it is described in *Sid Meier's Civilization* does not exist, as of yet. In game terms, this is a futuristic source of energy that will allow you to use nuclear plants as less expensive and completely safe sources of energy. The Nuclear Fusion advance also allows you to discover more Futuristic Advances to add to your final score. Unfortunately, by the time you have Nuclear Fusion and the Futuristic Advances, you have reached an endgame cul-de-sac where there is really not much more to do except turn off the light bulbs, conquer what is left of the world and wait for your space ark to arrive at Alpha Centauri.

Playing Tip: Fusion Power is a default cul-de-sac due to the endgame design. Unless you are short on power supply or have nothing better to do, there is no real reason to make this discovery.

F

MORE FUTURISTIC ADVANCES



Fusion Power is usually the last Advance you'll achieve before researching Futuristic Advances. Aside from something to do with your scientific research production, Fusion Power actually does contribute ONE thing. With Fusion Power, the risk of nuclear meltdown at Nuclear Plants is completely eliminated (see the rules, p.54). This makes Nuclear Plants the energy source of choice for their lower building and maintenance costs and, now, absolute safety.

After discovering Fusion Power, you must often decide whether to keep the light bulbs burning to achieve Futuristic Advances, or just go hedonistic (see Chapter 9).

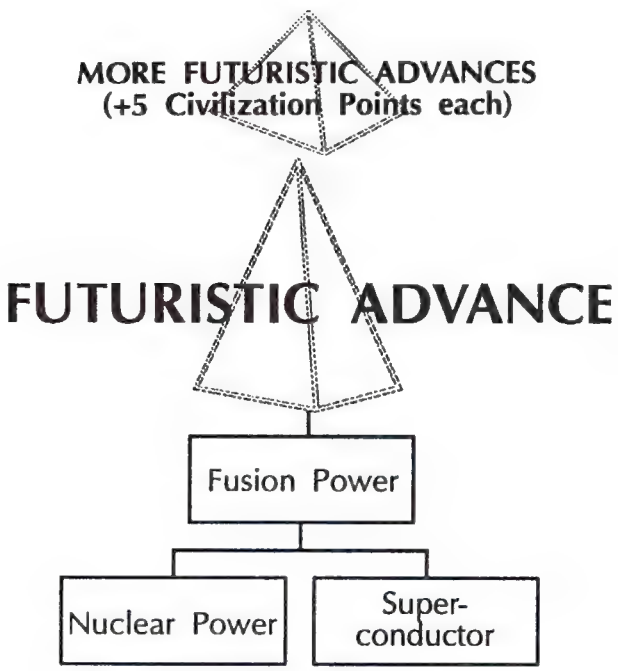
Futuristic Advance

Frankly, Captain, the odds are exponentially against my figuring out what it does.

—Mr. Spock?

Like Mr. Spock in the *faux* quotation that begins this short section, we cannot talk about this advance (possibly advances) because it hasn't been invented, yet. It is simply a placeholder in *Sid Meier's Civilization* to allow you to keep expanding your technology even though you have reached present-day limits. Sid has expressed the fact that the game was originally going to be over soon after you reached present-day limits, but he and Bruce decided that such an abrupt ending to technology was unfair and dissatisfying. So, you can not only acquire a Futuristic Advance by selecting this choice, but you can acquire more than one Futuristic Advance.

Playing Tip: If your ship is a long way from Alpha Centauri and you do not have much to do, just keep building these Futuristic Advances and adding those additional five points to your score. See Chapter 9 to determine whether this advance is worth your while or not.



During playtesting, this Advance was known as "The Meaning of Life" and, as the rules state, was worth +10 Civilization Points each time it was "discovered." The design decision was made to give players a generic Futuristic Advance (worth only +5 Civilization Points now, as indicated in the game's corrections) rather than letting players move around Hovercraft and Space Shuttle units during final few turns of the game. The question, though, is whether or not Futuristic Advances are even a good value at only +5 Civilizations Points each, considering their opportunity costs. See Chapter 9 for a discussion of this subject.

Genetic Engineering

Let's cell-ovate!

— Anonymous geneticist on the prowl?

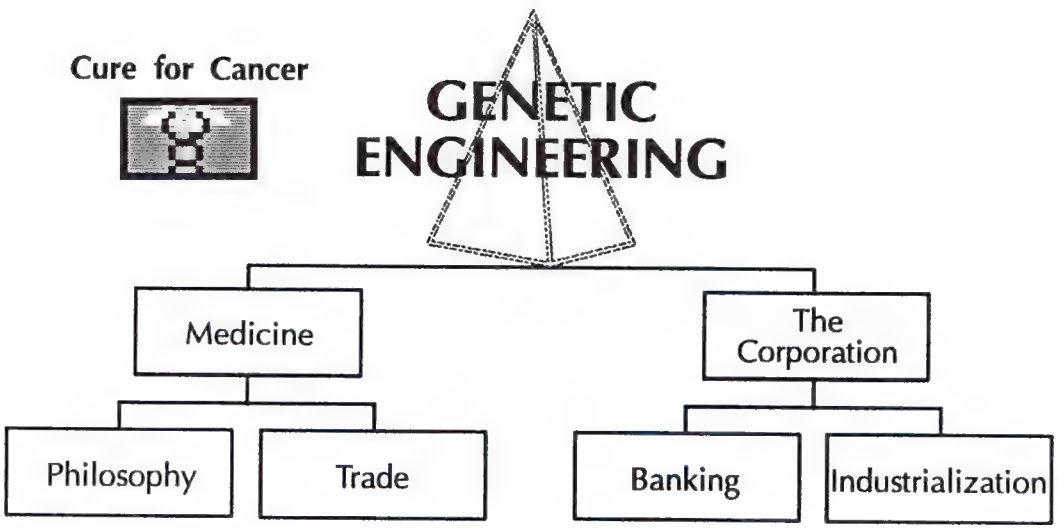
In 1959, most scientists believed that genetic engineering, the design of cells from the proteins up, was impossible. Today, it is an industry. Biochemists have already, according to K. Eric Drexler in *Engines of Creation: The Coming Era of Nanotechnology*, managed to create gene machines that allow them to design protein chains which will fold into the desired cellular pattern. Recreating a protein such as melittin, a toxin in bee venom, or modifying an enzyme is now a regular event.

Although Drexler warns that biochemists can currently only manage to put together very small protein chains, he sees a potentially viable industry for further genetic engineering. In *Sid Meier's Civilization*, Genetic Engineering is a blind alley for technology. You can use it to get the Cure for Cancer wonder (see the description in Chapter 8), but that is all. Although this use of Genetic Engineering is certainly logical, one cannot help but wonder if the advances flow chart should not be attached to the Futuristic Advance technology, as well.

Playing Tip: Unless you are way behind in the number of wonders of the world which you have constructed (or conquered) or have a desperate need for the one happy citizen per city that the Cure for Cancer wonder adds, we advise that you use your light bulbs to illuminate some other discovery. As noted in the Cure for Cancer discussion in Chapter 8, this one just isn't worth the effort.

G

Genetic Engineering



The single reason to pursue Genetic Engineering is to be allowed to build the Cure for Cancer wonder (which creates +1 happy citizen in each of the owner's cities). While the +20 points to one's Civilization Score and the happy citizens are nothing to sneeze at, Genetic Engineering can wait for more pressing discoveries to be made. This Advance is usually only to be pursued by "idle minds," as it were.

Gunpowder

That'll teach him to try to outdraw me with a muzzle loader.
— Billy the Kid?

As noted in the discussion on Explosives (earlier in this chapter), black powder was almost assuredly invented by the Chinese. Though the Arabs apparently used a black powder gun at the turn of the 14th century, many sources cite Chinese firearms as early as the 11th century, even though the first assured date of a Chinese cannon was 1356. In its first uses, black powder had to be thoroughly tamped down in order for the combustion to occur and fire the projectile. By 1420, artillery officers had discovered that corned gunpowder did not require the extensive tamping and that it virtually guaranteed combustion.

In *Sid Meier's Civilization*, the Gunpowder advance provides an entree', appropriately enough, to both the Explosives and Metallurgy advances. This is appropriate because the widespread use of Gunpowder during the latter part of the 15th century and thereafter brought about the casting of new cannons and the manufacture of small arms from bombards and arquebuses to the more modern muskets and rifles (hence, the Metallurgy advance and subsequent Cannon unit). The Explosives advance, along with the obsolescence of the Great Wall wonder (see Chapter 8), is fitting because black powder was the only explosive for both peacetime and wartime use until the development of nitroglycerin.

Playing Tip: The Gunpowder advance is extremely useful whether your civilization is in a peacetime or wartime economy. It allows you to build Musketeer units immediately and they are very good garrison units. Further, both of the advances which are built upon Gunpowder technology have valuable peacetime and wartime benefits. Discover the Gunpowder advance at the earliest possible time within the game context.

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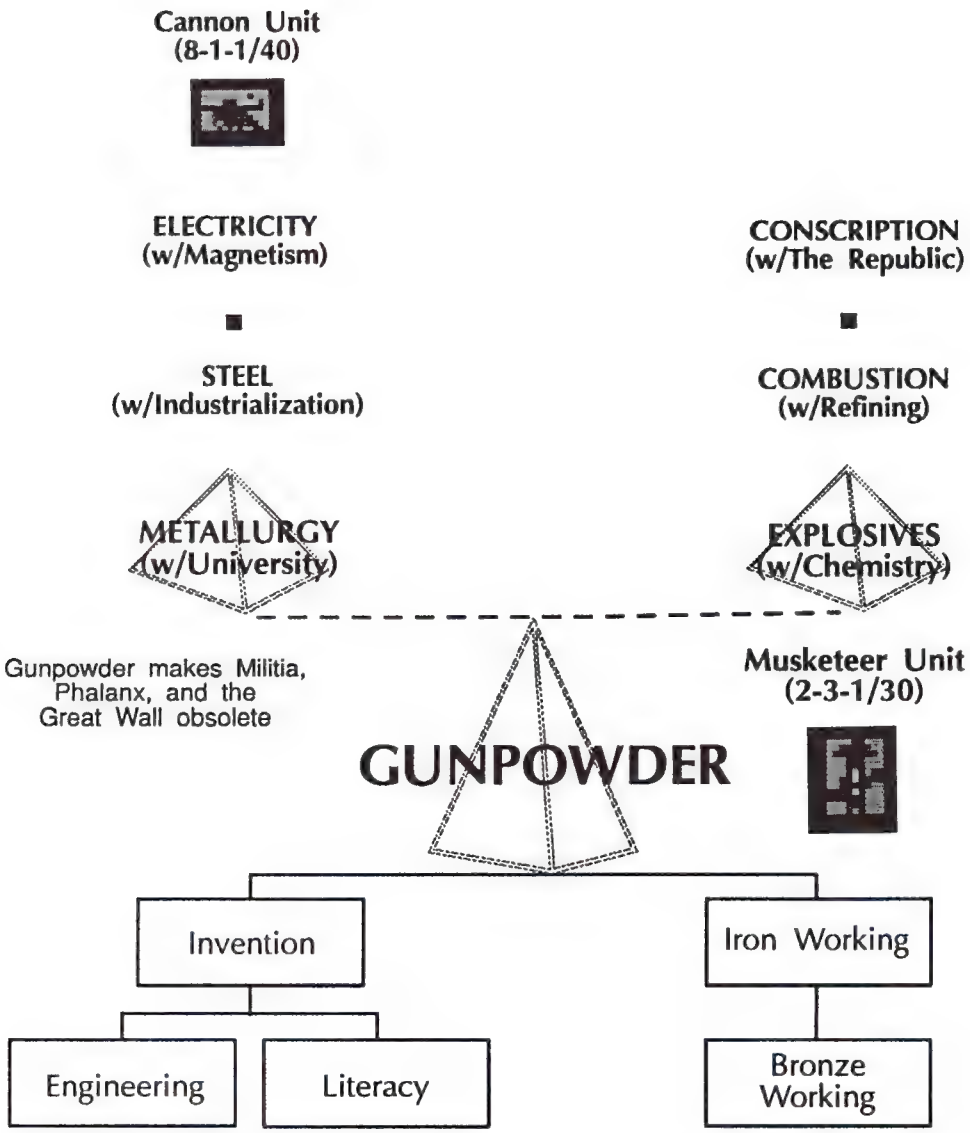


Gunpowder is one of the three big Advances that really changes the complexity of the game (the other two being Navigation and Industrialization). Gunpowder makes all Barracks obsolete and, when rebuilt, they now have a maintenance cost of one coin per turn. While Gunpowder also makes the Great Wall wonder, Militia and Phalanx units obsolete, it does allow for Musketeers to be built (with their now highest defense strength in the game of 3). To counter this new defensive threat, Metallurgy must be pursued by the war-minded in order to obtain Cannons. Gunpowder is usually a priority Advance, just don't forget to sell off all your Barracks immediately prior to its discovery!

GRAPHICS NOTE: The soldiers are upgraded to Musketeers when a city is conquered by a civilization that achieves Gunpowder.

Horseback Riding

Always look a gift horse in the mouth.

— King Priam of Troy?

As suggested in Chapter 3, horses are particularly important to civilizations who live on steppes or plains. The long distances between settlements and natural springs make the extra speed of the horses worthwhile. Then, since the plains and steppe tribes are so familiar with horses in their everyday lives, it is a minor adjustment to begin using them in war.

Although horsemen were used as scouts from earliest times, cavalry operations did not become profitable, though, until the invention of the stirrup. This invention allowed mounted warriors to maintain their balance with their feet and allowed for, potentially, "hands free" combat. In *Sid Meier's Civilization*, there is no special requirement for the invention of the stirrup and Cavalry units may be built immediately upon obtaining the Horseback Riding skill. In order to move up to the well-armed Knight units, however, you will have to select the Chivalry advance after you obtain Horseback Riding. Chivalry is the end of the technological track for this advance, though.

Playing Tip: You won't need to obtain Horseback Riding unless you find yourself in the middle of a hot, shooting war during the earliest part of the game. Otherwise, you are better off selecting advances that have a future.

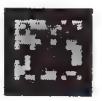
H

Knight Unit
(4-2-2/40)

CHIVALRY
(w/Feudalism)

HORSEBACK
RIDING

Cavalry Unit
(2-1-2/20)



Horseback Riding

Horseback Riding offers very little. While it is required to obtain Chivalry (and the valuable Knight unit), that is ultimately a dead end advance path. Still, Cavalry Units are some consolation, but not much! This Advance can usually be stabled for quite a while unless there are long term prospects for many immediate wars ahead. If it's looking hostile out there, better saddle up and move 'em out, pilgrim.

Industrialization

I'm really steamed!

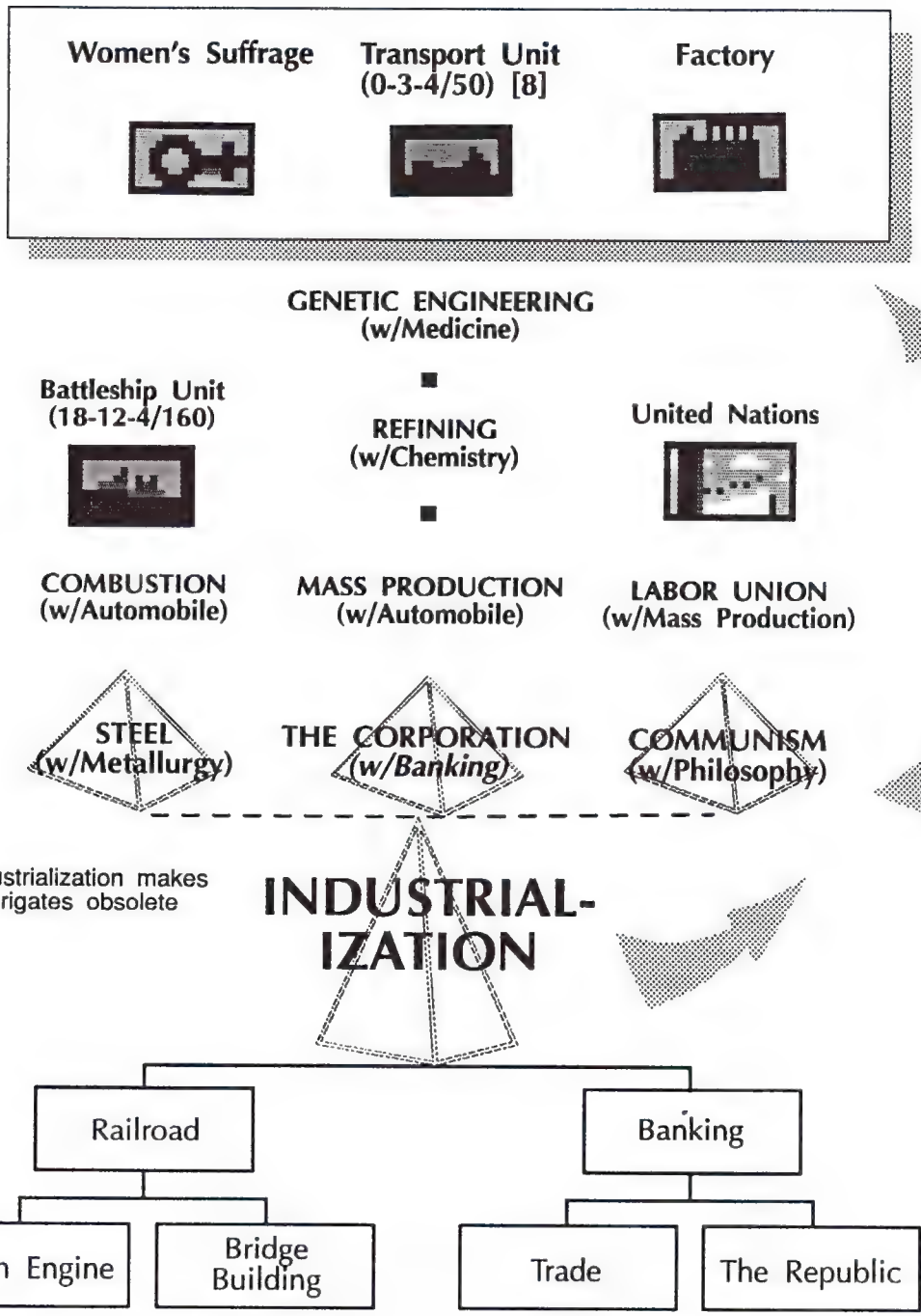
— James Watt?

As noted in Chapter 4, the 19th century was when British industrialists began to use steam power to looms, spinning wheels, printing presses and the like. This use allowed a leap in scale that permitted capital increases in the size of production. It was a massive revolution that swept through Germany, the United States, Russia and Japan by the end of the decade. Whereas the British tended to be rather conservative in how fast they allowed technological innovation to be improved once they had a successful process in place, the Germans and Americans underwent more than half of a decade of experimentation and innovation that widened the scope of industry.

In *Sid Meier's Civilization*, Industrialization is an important transition point between the mid-game and the endgame. Most importantly, acquisition of the Industrialization advance will enable you to build Factory units in order to start your own Industrial Revolution and enact Women's Suffrage in order to protect you from Civil Disorder when you have Democracy in place. Then, you can move up the evolutionary scale in order to build Armor units (after attaining Combustion) and Battleship units (after obtaining Steel technology).

The downside, as noted in Chapter 4, is that Industrialization's onset means that you have to start dealing with pollution problems.

Playing Tip: Industrialization is such a key advance to obtain that you would be wise to get it as soon as you have your borders secured, your primitive economy functioning efficiently and you are ready to accelerate technology toward the space race.



Industrialization is what kicks off the modern era and you are advised to achieve it with all haste. Almost everything about it is good. Factories will increase resource production in their city by 50%; Transport units will greatly enhance your sealift capacity; and Women's Suffrage is, arguably, the single most important wonder in the game (so drop everything to build it if no one else has).

On the down side, building up from Industrialization to other Advances doesn't offer a lot (Battleships from Steel are useful, though). The real "bad news," however, is that population pollution begins to be factored in, beginning at 25% of a city's population.

GRAPHICS NOTE: The people standing in front of a city are upgraded in the View City display and the modern parade occurs during a "We Love the King Day."

Invention

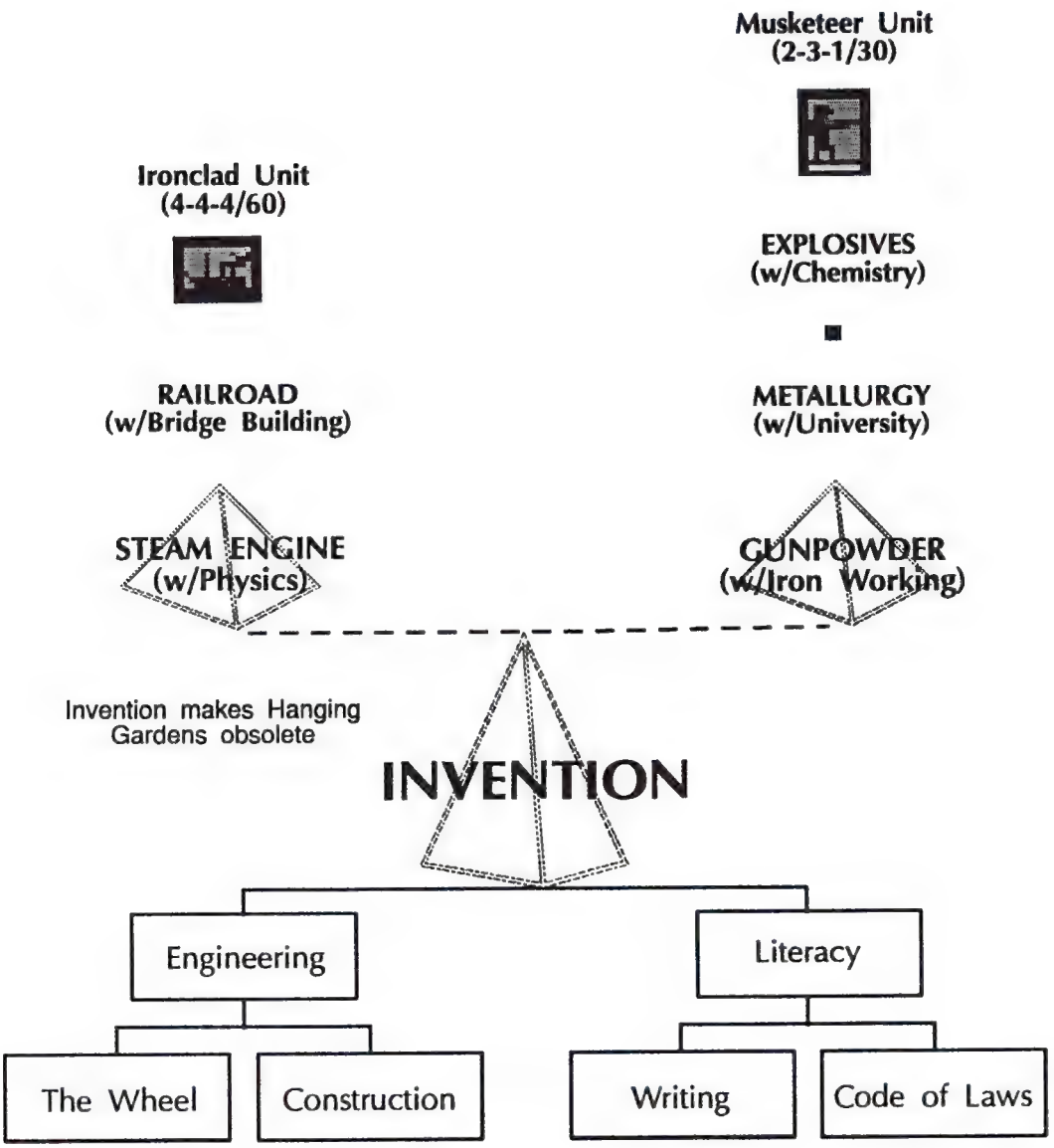
I reinvented the wheel, but it didn't fly.
— Leonardo da Vinci?

Invention is the novel application of the natural or ordinary to old problems. There is no one particular era of invention that can be singled out as the Age of Invention. As Fernand Braudel established in his *The Structures of Everyday Life*, it is difficult to assess the impact of any innovative technology because it begins with the idea (*inventio*) and, after sufficient time for maturation, reaches its fruition as the idea is put to work (*usurpatio*). To illustrate his point, Braudel noted that the symbol of Death reaping souls with a scythe (during the 14th century plagues) was anachronistic because it anticipated the use of the scythe to *harvest* grain that did not reach general use until the 19th century. During the 14th century, the scythe was small and used primarily to cut grass. It took time, he contended, for the *concept* to become the *invention*.

Under different circumstances, Daniel Boorstin alluded to this time lag between idea and application when he told of the formation of the Royal Society in 1662. The architect, Christopher Wren, appointed a soon to be famous scientist by the name of Robert Hooke as Curator of Experiments. Hooke's purpose was to build the machines which others were suggesting. Hooke was later to pen in his *Micrographia* that it was time for science to move from the real of "the brain and fancy" to the more grounded observation of the "material" phenomena in the world.

In *Sid Meier's Civilization*, the Invention advance most closely represents the era of application in which the application of scientific theory was achieving concrete use prior to harnessing steam to machines and gunpowder to mining.

Playing Tip: Invention is vital, whether you need to improve the war effort by taking the Gunpowder advance or you need to keep improving your production by moving through Invention to Steam Engine and on to the *very* important Railroad advance.



With necessity as its mother, Invention is a lynchpin Advance on the road to both the Steam Engine (which leads to the critical advance of the Railroad) and Gunpowder (which takes you into a grand new epoch of warfare Advances). Of course, if you don't own the Hanging Gardens, there's the extra satisfaction of negating that wonder's benefits for an opponent. The discovery of Invention can wait for emergencies, but should remain a fairly high priority despite other pressing needs.

GRAPHICS NOTE: Advisors take on their modern look once a civilization achieves the advance of Invention.

Iron Working

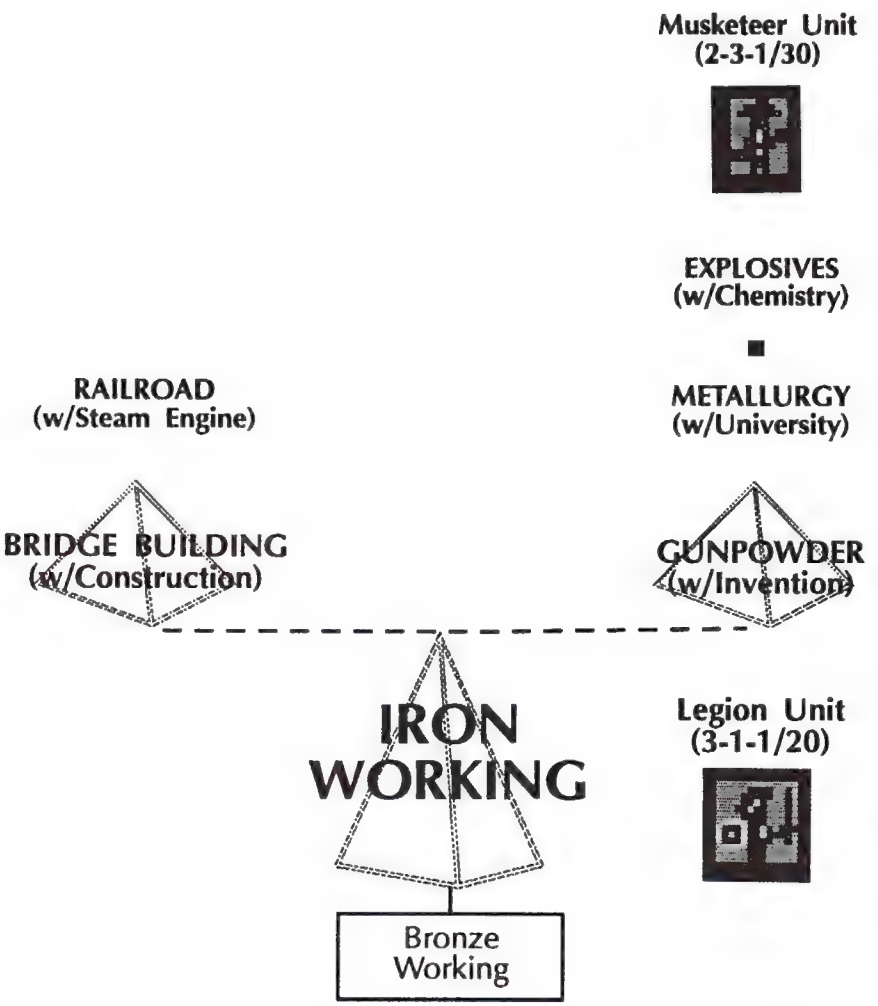
Even so, give me a bronze warrior any day!
— Anonymous Greek maiden?

Iron smelting actually preceded the period of history known as the Iron Age. In fact, the technology of smelting iron appeared in different geographical regions at various different times so that it is really more accurate to speak of the Iron Age in specific locations than it is to attempt to locate one particular global era. Iron was apparently known in the Middle East as early as 3000 B.C., but was not actually used to produce large quantities of tools and weapons until around 1200 B.C. or *after* the so-called Bronze Age. In China, however, the technology is not in place until roughly the 6th century B.C., during the Chou (sometimes written Zhou) Dynasty.

As noted in the discussion on Bronze Working, iron was not really any stronger than bronze when it was forged, so it was not the superiority of iron weaponry over bronze weaponry that brought about the victories of armies with iron weapons as opposed to bronze weapons. Rather, it was the availability of iron ore in greater quantities than that of copper ore and tin so that kingdoms could make more weapons and arm more soldiers with iron weapons than they could with bronze.

In *Sid Meier's Civilization*, Iron Working is defined as the early smelting found in the so-called Iron Age societies and lets you immediately purchase Legion units, but leads you on to Bridge Building, Gunpowder and Metallurgy, advances that relied on smelting iron ore at higher temperatures with coke (see Metallurgy) and that were not in general use in Europe until the late 18th century.

Playing Tip: Get Iron Working as soon as you are likely to be able to acquire Construction so that you can gain the production bonus from Railroad technology.



While Iron Working presents a fine short-term benefit in the form of Legions (a cheap offensive military unit), its long term benefits are more profound. Both Gunpowder (with its Musketeer unit) and Bridge Building will be many advances away, so Iron Working can be put off for quite a while if there is no pressing need to form Legions. Still, be careful not to let this Advance get "lost in the shuffle," as it will be needed eventually.

Labor Union

I think it means Anti-Federation of Labor.
— John D. Rockefeller?

In the late 18th century, many artisans began to realize that they were being squeezed by capitalists playing them off against each other. Not knowing what kind of wage their neighbor was accepting or what working conditions their fellow craftsmen were tolerating (until it was too late), these skilled laborers banded together in secret societies to pass information on negotiations and to band together in maintaining certain minimums in wages and hours.

Corporations fought this informal organization, once they figured out what was happening, by prosecuting any invididuals who cooperated with the societies under "restraint of trade" legislation. In England, this was countermanded by an act of the House of Commons which was passed in 1824 and allowed "collective bargaining" between workers (whether the skilled artisans of the original societies or unskilled) and their employers.

In both England and America, the labor movement took root during the 19th century. Organizations like the Amalgamated Society of Engineers in England, formed to keep "skilled labor" at a low enough level (through the use of apprenticeship) so they could control the supply of workers, and the American Federation of Labor (founded in 1881), which won many battles against mine owners and steel corporations before losing ground to the so-called "open shop" law, were important milestones in the labor movement.

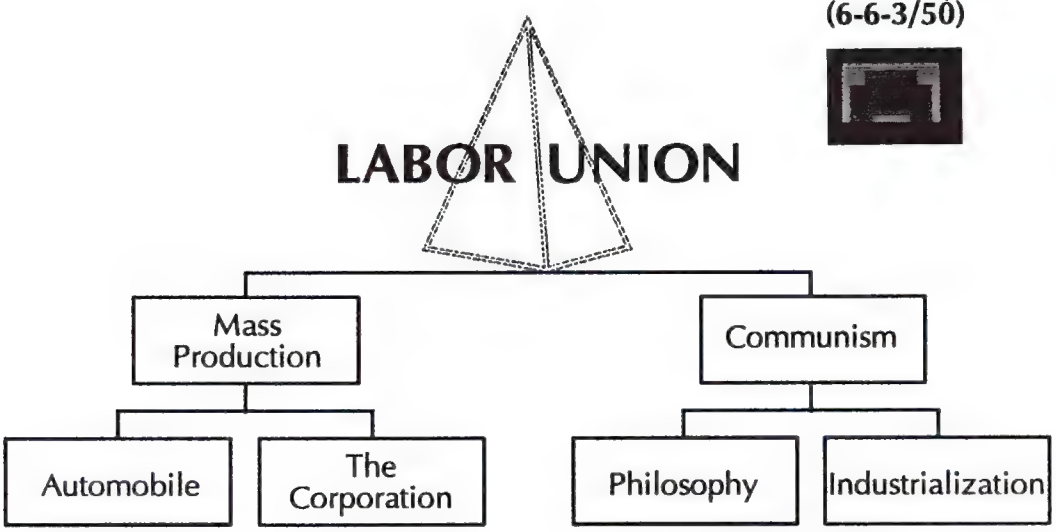
In *Sid Meier's Civilization*, labor unions are irrevocably aligned with Communism. This is a rather unfortunate oversimplification that misleads many into thinking that *all* unions were/are socialist in nature, rather than a correction to free market excesses.

Playing Tip: The Labor Union, perhaps a subtle propaganda on the part of the designers, is a dead end in the game. Unless you are fighting a desperate defensive struggle and need Mechanized Infantry units, don't bother with it.

L

Labor Union

Mech Infantry Unit
(6-6-3/50)



You can count on one finger the reason to discover Labor Union: to get Mechanized Infantry units. As the land unit with the best defense in the game, combined with a speed high enough to keep up with Armor and Artillery units, Mechanized Infantry has its place on the modern battlefield, but is not really necessary for city defense, since the cheaper Riflemen can easily do the same job. This is not a very urgent Advance and can usually wait forever (unless you're a military strategist who enjoys "combined arms" tactics).

Literacy

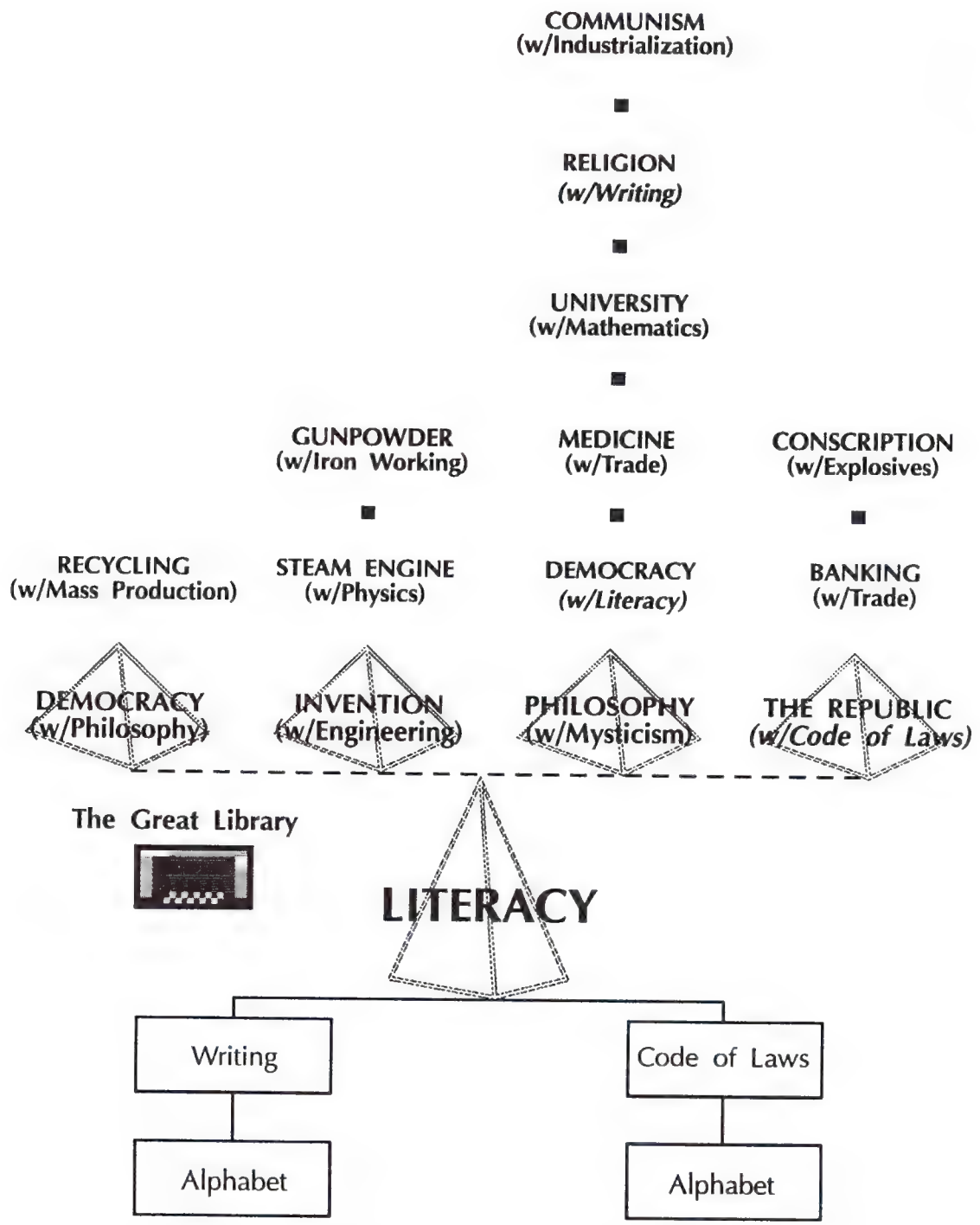
All I know is what's read to me out of the paper.
— William Randolph Hearst?

Literacy is, of course, an outgrowth of writing. Writing originates in the necessity of accounting for the accumulated wealth, taxes/tribute collected and obligations outstanding with regard to a ruler's or kingdom's treasury. Literacy, of course, originates in the need to be able to interpret the symbols which have been written (or in the case of the Incas, tied in knots at significant portions of the cords where the accounting information was stored).

As time progressed, the potential of writing to ensure both the stable transition of secular law and the codification of sacred ritual and doctrine from one generation to another (or to pass diplomatic and religious communications from one tribe, city-state or civilization to another) was perceived. This meant that persons within a society who had obtained literacy could aspire to a court position (diplomat, scribe, accountant or manager) or temple position (priest, scribe, or accountant). So, early in civilization, literacy was a guarantee of a higher social class.

As the uses of writing and the requirement of literacy became more prominent, the usefulness of the materials stored required more and more individuals to attain literacy. Eventually, literacy became so widespread that its possession was longer a guarantee of higher social class (this is true at the end of the Roman Republic and the beginning of the Empire, for example). In *Sid Meier's Civilization*, Literacy is as indispensible for the development of any civilization as it has been throughout history.

Playing Tip: You should obtain Literacy as soon as possible, especially if your civilization is at peace. In that way, you can move quickly through Philosophy and Democracy to higher and more efficient production. If, of course, your civilization is under siege, you may want an advance that will offer more immediate military assistance.



Where would civilization be without Literacy? (Not reading this book, certainly.) Like Philosophy, it is a tree with many branches and opens up many important Advances to discovery. Paramount among them is The Republic, which can be researched immediately. If times are peaceful, upgrading to this form of government will increase trade (and thus coins, luxuries and light bulbs) dramatically. The Great Library, too, is an excellent ancient wonder, affording you "free" Advances should any two other civilizations acquire the same technology until University is discovered. This wonder is particularly ideal when you begin the game in an isolated position.

Magnetism

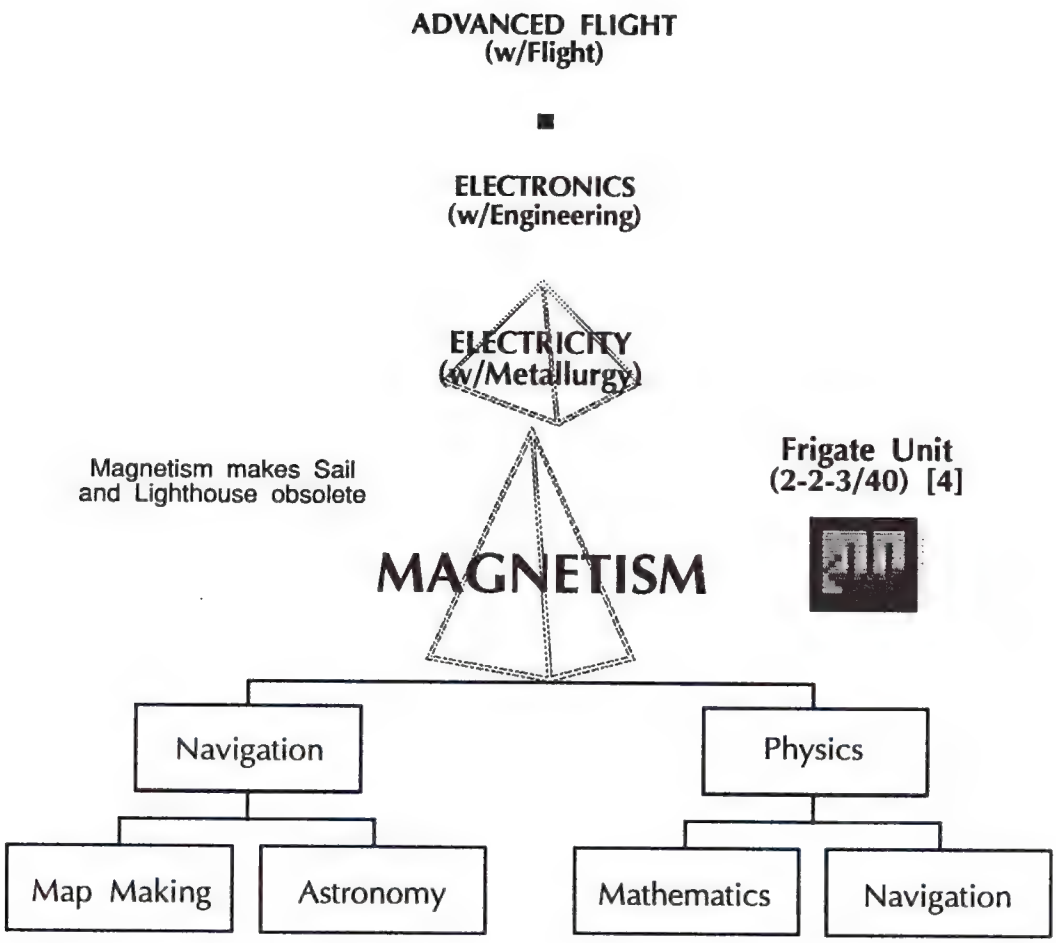
Opposite poles attract. That's why we're co-authoring.
— Johnny Wilson and Alan Emrich?

As noted in the Civilopedia of *Sid Meier's Civilization*, magnetism is the force of attraction or repulsion between substances. First associated with lodestones (literally, "the stone that leads"), small pieces of magnetite which were used in divination by the ancient Chinese, magnetism came to be important in the history of Navigation because it enabled sailors to move from the wind rose (a card with four, eight or twelve "winds" or directions listed on it) to the magnetic compass (with its 16 or 32 compass points). Magnetism was also important during the development of electricity since that is what Michael Farraday was studying when he developed many of the theories of electrical conductivity which, in turn, led to the harnessing of electricity.

According to Daniel Boorstin in *The Discoverers*, magnetism gets its name from the locale known as Magnesia (near the Aegean Sea in Thessaly). It was, apparently, an early source of lodestones (magnetite). Their local legend said a shepherd named Magnes had the iron nails in his shoes and his iron shepherd's staff stick to the ground. If that sounds improbable, how about the idea that placing a lodestone under an adulterous wife's pillow could make her confess, swallowing a small piece of magnetite was a useful contraceptive or that onion and garlic breath could demagnetize the stone? Seafaring superstition would not even allow sailors to have onions or garlic for fear of ruining the compass.

In *Sid Meier's Civilization*, Magnetism has the immediate advantage of enabling you to build Frigate units and eventual advantage of placing you on the path toward Advanced Flight.

Playing Tip: If you elect to study Magnetism, be certain that all of your military units aboard Sail units will be able to reach their destinations before the advance comes on line. Then, focus on high-tech advances.



While the Frigate unit is nice (with the same cost as the Sail unit it makes obsolete, double its combat strength and having an extra unit in carrying capacity) and making the Lighthouse wonder obsolete can be interesting (if you don't own it), the real point of discovering Magnetism it to get to Electricity. However, while Electricity is certainly the path to such high-tech advances as Electronics and Computers, all of that is going to take time. Consequently, Magnetism can (and often has to) wait for more pressing Advances to be made which offer more immediate returns on the light bulbs invested. The only question remaining, therefore, is "which way is north?"

Map Making

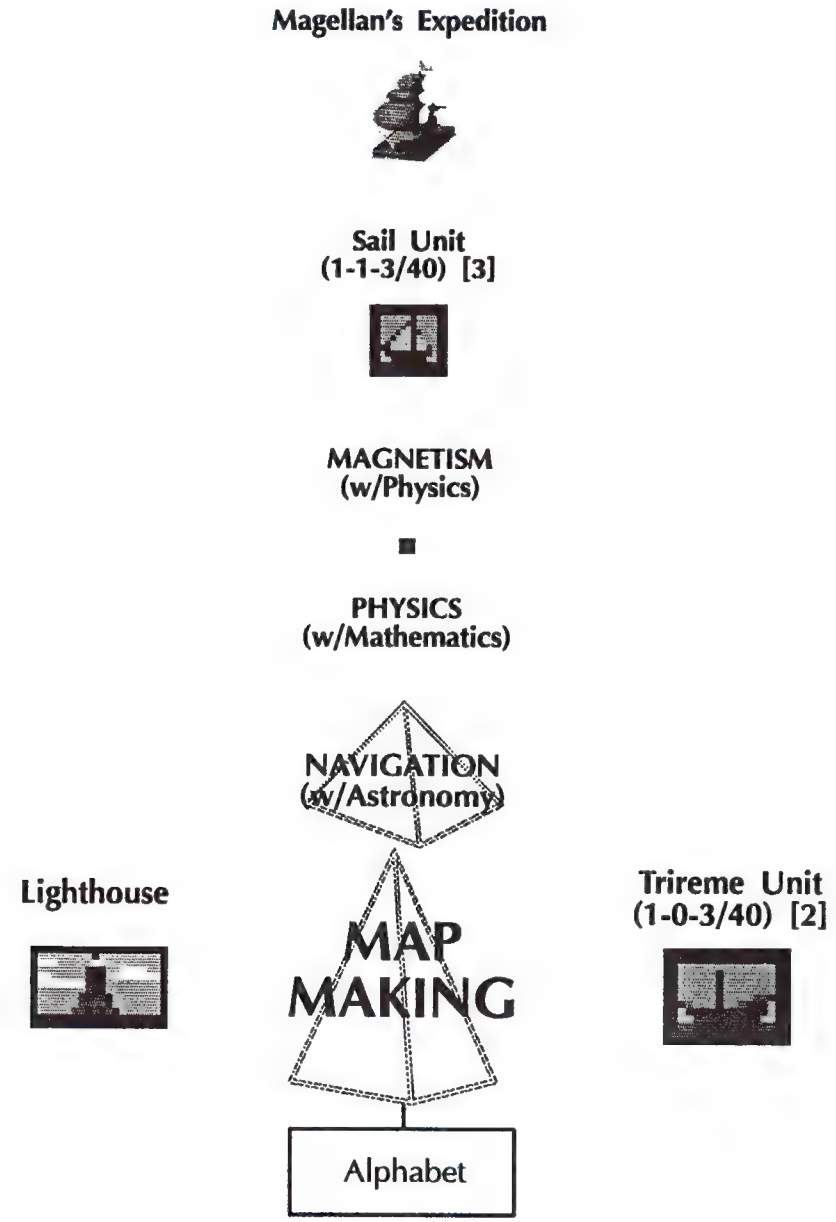
If the globe isn't correct, I only charge a flat fee.
— Amerigo Vespucci?

Although some historians suggest that the cave paintings of early man may have been depictions of game trails which would have had practical significance to the hunters within the settlements and others suggest that mapping may be an outgrowth of writing in which springs, wadis and sites where timber, prey for hunters or gems might have been depicted on bark, skins or tablets, the earliest certain map dates back to the Old Babylonian Empire (circa 2300 B.C.). Maps were exceedingly useful sources of information which, in both ancient Babylon and Egypt, were used to keep track of the fertile fields under cultivation and boundaries of influence. In Babylon, the practice of mapping seems to have had an outgrowth in some of the earliest architectural drawings of canals, roads, temples and palaces.

It was not until classical Greek civilization, however, that there seems to have been any interest in creating maps of the world. The impetus for mapmaking was, without doubt, the very practical need of Greek sailors of keeping track of coastlines and harbors as they plied their maritime trade. The philosophical interests of the Greeks soon gave rise to such global maps as the effort of Herodotus in the 5th century B.C.

By the time of the Roman Empire, the concern with maps no longer featured the mathematical concerns or philosophical curiosity of the Greeks. The Romans were strictly interested in maps that were useful for military campaigns and political administration. It was not until the great ages of exploration from the 15th century onward that the maps of the world began to show an interest in the whole world, once again.

Playing Tip: The smaller and less productive your civilization's original continent is, the higher the priority you will have for Map Making. Like the Greeks, Map Making serves two purposes: maritime commerce and exploration (build Trireme units) and a curiosity about the earth that will lead you to technological growth.



The need for Map Making is usually directly proportional to the isolation of your starting position. If you start on a fairly small island (as opposed to a large continent), it is a vital necessity so that new lands can be discovered, explored and settled. Since early growth is essential, probing around with Triremes will be vital if you're "bottled up" in a small area at the start of the game. Ultimately, of course, Map Making is part of the Navigation advance, and Sail units will make every corner of the world attainable very quickly.

Masonry

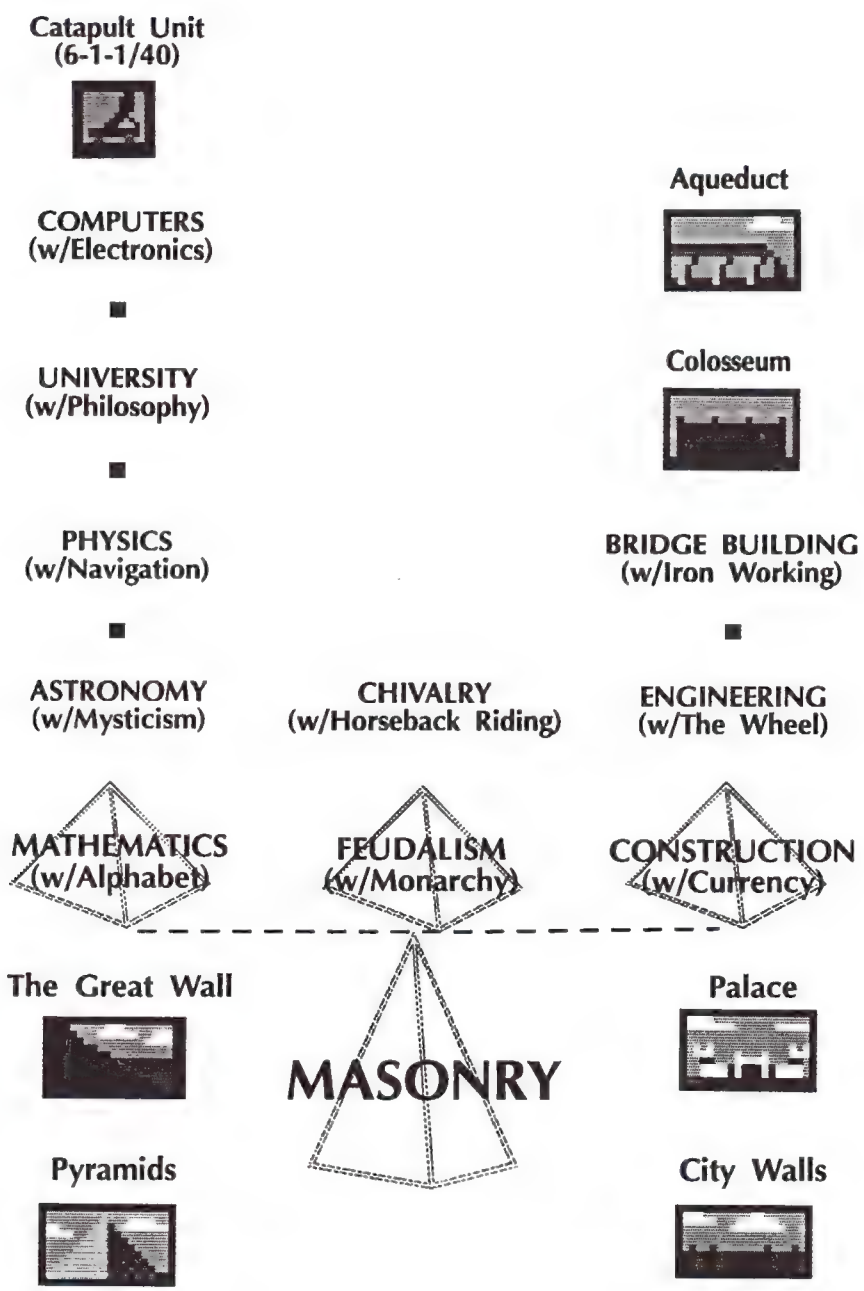
And it's so handy. If we don't build it right, we get stoned.
— Early Egyptian stone mason?

The use of stones as a building material is an excellent example of humankind adapting the natural resources at hand into technological applications. Even in prehistoric times, there is evidence of settlements in Ireland where circular stone huts were built from materials gathered at hand. These early "masons" dug a circular trench and anchored the larger stones in place, partially within the trench and partially above the ground, in order to create a stable foundation.

In Egypt, masonry has been attested as early as the 4th millenium B.C. and was intrical to their state and ceremonial building programs. In Assyria and Persia, masonry developed via a brickmaking industry that created artificial stones from the mud and clay available in their surroundings. The Greeks were able to refine the art of cutting stones with fine edges and smoothing them together with a limestone mortar.

One of the most important advances in the history of masonry was the development of concrete under the Romans. The Romans made a cement out of the volcanic ash which was readily available in their locale and later, added rocks to create concrete. The invention of concrete allowed prolific use of arches in all types of construction.

Playing Tip: If you discover early in a game of *Sid Meier's Civilization* that your civilization is "not alone" on the continent, it is an extremely good idea to place Masonry skill high in the queue so that you can build City Walls and defend yourself more readily from attack. Of course, Masonry is a necessity for any civilization because it opens up the possibility of obtaining Mathematics and Construction, two advances which allow you to accelerate technological advancement considerably.



Masonry not only builds, but also opens many doors. Unless you are in a hurry to obtain Triemes (through Map Making) or Monarchy (via Ceremonial Burial and Code of Laws), Masonry is the perfect second or third research choice (after Pottery and, possibly, the Alphabet). The City Walls are mini-wonders of their own (preventing floods and greatly improving a city's defenses for all time), plus the Pyramids (with their governmental benefit) and the Great Wall (assuring peace) are both highly useful. The only player who wouldn't quickly pursue Masonry as a cornerstone Advance could best be described as a "gold brick."

Mass Production

Parts is parts!

— Eli Whitney?

Mass Production is based on the concept of specialized labor designed to ensure increased efficiency. It hinges on the theory that more of a given part can be produced in less time if the laborers who assemble/build that part do not have to switch from one activity to another in order to accomplish their portions of the overall task.

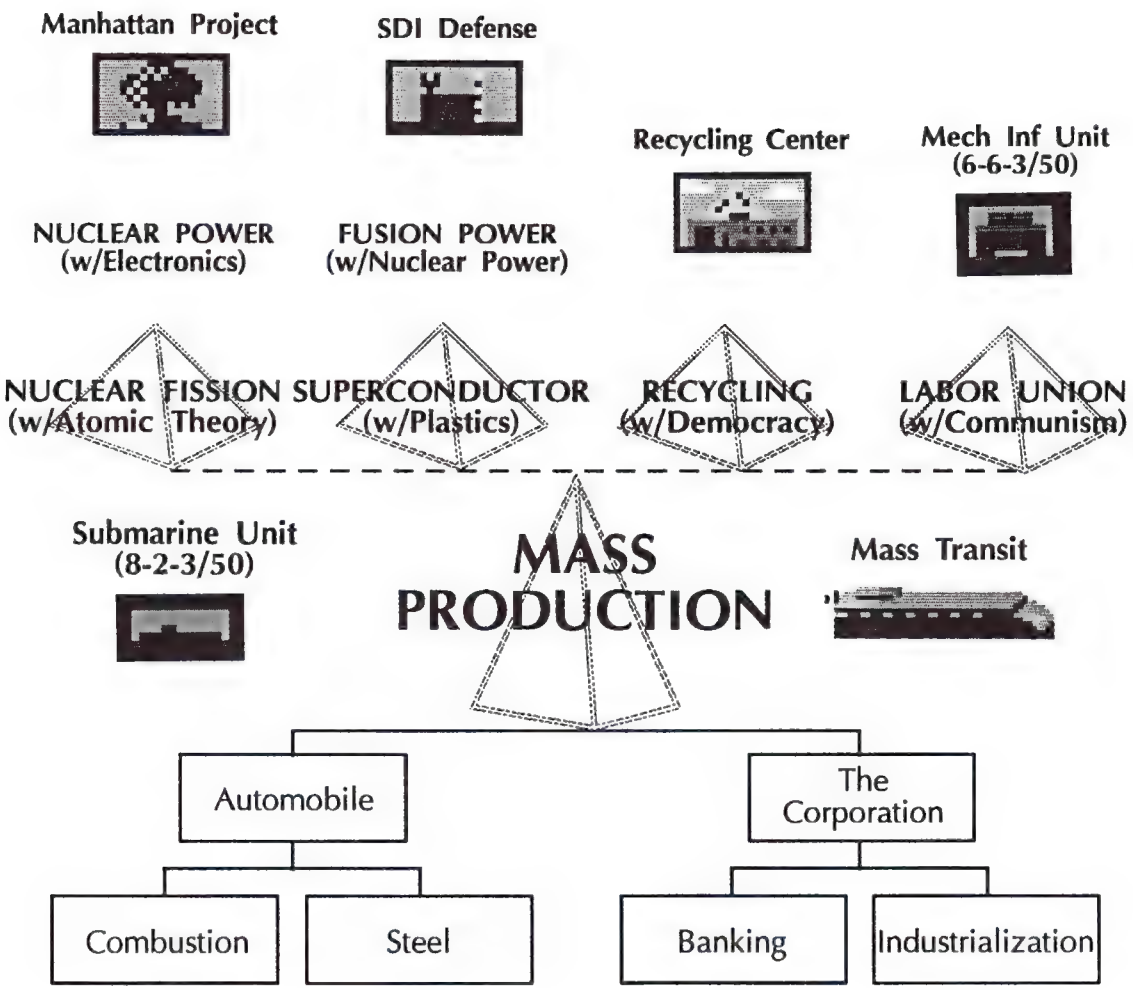
Although the potter's wheel of ancient civilizations is technically an example of mass production's superiority over the ring and coil method of making pottery and both the Etruscans and the Romans used molds to make pottery, the potential of mass production was just beginning to be realized in the latter portion of the 18th century. Adam Smith's *The Wealth of Nations* cited an example of this efficiency at the beginning of the book when he referred to a pin manufacturer with ten employees. One man drew out the wire, another straightened it, a third cut it, a fourth sharpened the point and the fifth ground it at the top to make the head. According to Smith, the ten men made 48,000 pins in a day where, by themselves, he doubted that they could have averaged 20 pins per day.

In 1798, Eli Whitney managed to formalize this division of labor when he proposed the manufacture of guns by the use of interchangeable parts. Given a contract for 10,000 guns, Whitney reportedly tooled up for the job by creating templates and molds for each individual part. In that way, some portions of the *ad hoc* assembly line could be manufacturing individual parts while others could be assembling them.

In *Sid Meier's Civilization*, Mass Production does not represent these early experiments with the division of labor. Rather, it follows Henry Ford's use of the assembly line.

Playing Tip: You should acquire Mass Production as soon as it becomes available. From it, you can solve your pollution problems with Mass Transit and move onward to the most advanced technologies necessary to win the space race.

M



Mass Production is a kiss and a curse at the same time. The curse is that the pollution formula takes a jump and now includes 75% of a city's population (up from 50% with the Automobile). The kiss, however, is that a Mass Transit improvement will completely eliminate a city's population pollution when built. While the added benefit of being allowed to build Submarine units is only marginal at best, every Advance leading up from Mass Production is worth pursuing. Consequently, there will be a lot of good Advances to choose from for the future once you start Mass Production.

Mathematics

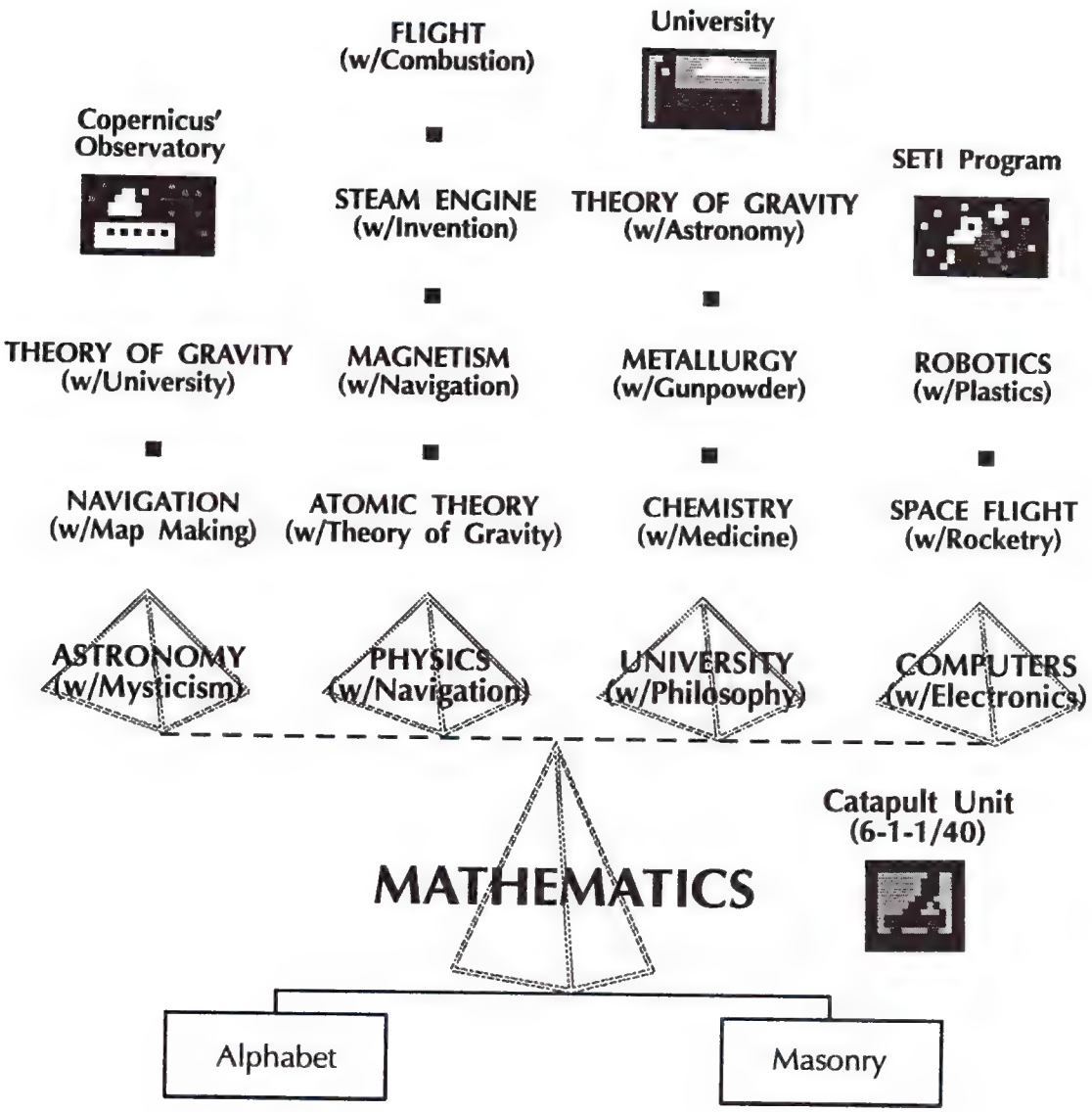
I said cubit, not to cube it.
— King Nebuchadrezzar to his architect?

Mathematics, like Writing, originated in the need to keep an accounting of the wealth and obligations of a given kingdom and its citizens. In addition to elementary arithmetic where an overseer would literally count or subtract sheaves of wheat or baskets of figs, there came to be a need for weights and measurements, as well as a need for monetary transactions. Terms such as cubit (the length of the average man's arm from elbow to the end of the middle finger, approximately 18 inches) and shekel grew out of the need for these weights and measures. In addition, the need to make change in market transactions inspired the scribes of Hammurabi's era (1700 B.C.) to create a system with notational place value. Instead of the decimal system which is in use in most of the modern world, the Old Babylonians used a sexagesimal system (where 3.40 of a larger monetary unit is equal to 220 of a smaller monetary unit, as opposed to 340 cents in U. S. currency).

By the time of Greek civilization, astronomical calculations and mathematical demonstrations of geometrical theory began to be in vogue. In the work of Euclid and Archimedes (circa 300 B.C.), the mathematicians were very helpful in describing the area and capacity of a space or object, but not very good at understanding movement.

In *Sid Meier's Civilization*, Mathematics is a symbol of these early attempts to explain production and natural phenomena in terms of calculation. It is vital for both early and late technological advances.

Playing Tip: As noted on the Mathematics "Pyramid of Progress," Mathematics is needed early in the game for two specific reasons: building Catapult units for defense and discovering Astronomy and Navigation in order to build Sail units and move off the original continent. You may not need Mathematics initially, but you definitely will need it eventually.



While Mathematics is an important element for many other Advances down the road, it really only offers two benefits early in the game. The first, and usually the most important, is that it allows you to begin building Catapults. These are the best offensive weapons until they are replaced by Cannons, and you should use them offensively to capture enemy cities and defensively to return fire against beseiging enemy units. Mathematics is also useful when you are rushing to acquire Sail units since, with Mysticism, it will get you to Astronomy (and, thus, half way to Navigation). Only peaceful players on a large continent will probably not need to rush toward Mathematics.

Medicine

The good news is that we know what you have. The bad news is that we don't know how to treat it.

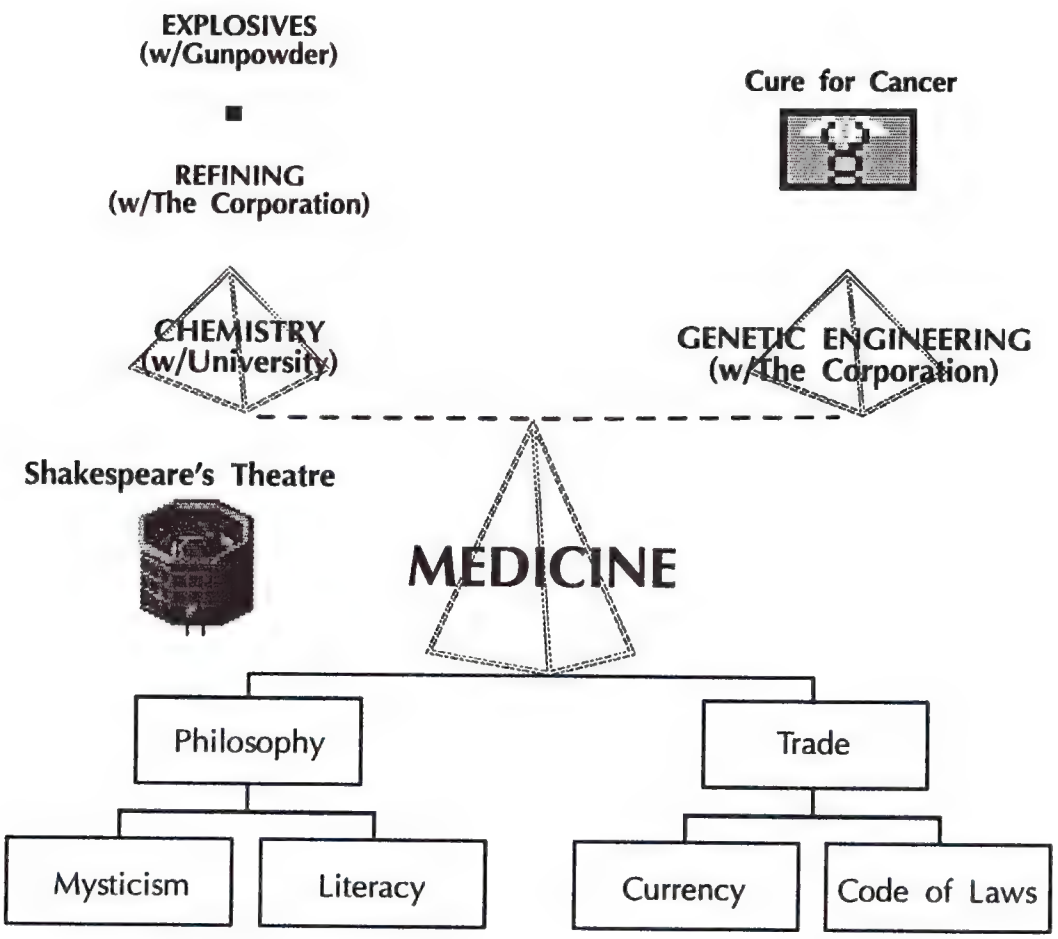
— Hippocrates?

Medicine, like chemistry, has its origin in alchemy. Since primitive man was a superstitious being and believed that most diseases were a result of demons, spirits or the displeasure of the deity, the treatments tended to be a combination of the use of herbs (in a type of folk medicine approach where different herbs were supposed to have beneficial effects for generic types of health problems) and exorcism (whether in ritual ceremonies or application of herbs or minerals).

In both Oriental and Occidental civilization, a theory of humours developed that suggested an individual's make-up was determined by body fluids. A person who had more phlegm was phlegmatic (somewhat lethargic and withdrawn), while a person with plenty of blood was sanguine (very active and outgoing). Further, a person with a lot of yellow bile (*choler*) was likely to be aggressive, while an individual with black bile (*melancholia*) would tend to be moody (melancholic). In Oriental civilization, the humours were strictly breath, phlegm and bile. The treatment, then, of various maladies was based upon the humour which needed to be brought back into balance. In spite of occasional schools of opposition, such beliefs were the dominant theory from Hippocrates and, later, Galen in a tradition that extended up to the Renaissance. At that point the humours were discarded in favor of experimental medicine that drew from surgical experiences.

In *Sid Meier's Civilization*, Medicine is primarily the early experimentation of the Greeks that eventually led to developing Chemistry, though it does allow Genetic Engineering as a later advance.

Playing Tip: If you are at peace, you will want to put Medicine on your short list of early to medium advances in order to acquire Chemistry and the resultant advances that come thereafter.



The one important thing to remember is that Medicine begats Chemistry. The advance of Chemistry will lead to Explosives which, in turn, will get a player to Combustion (and hence to Flight and the Automobile). In other words, Medicine is a distant link in a very long chain of important Advances. Sure, it prevents you from ever being plagued by a plague again. Sure, it allows for the building of the Shakespeare's Theatre wonder (which does very little and for a very limited time). Who cares? Medicine is often tabled for other, more pressing Advances which yield more immediate rewards. At some point, though, a dose of Medicine will lift your ailing civilization out of the dulldrums.

Metallurgy

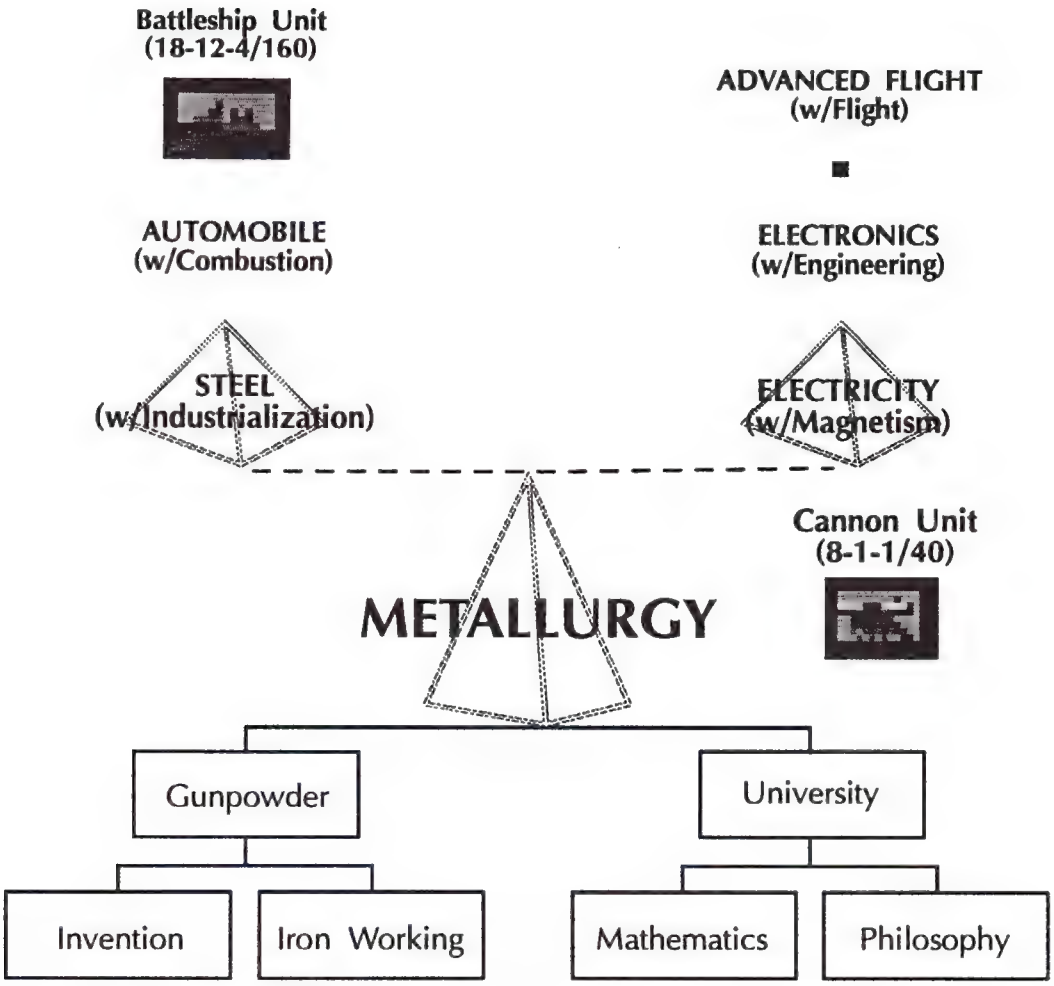
If I do it, do I win a metal?

— Sir Henry Bessemer?

Metallurgy, the extraction of metal from its natural ore in order to be refined and used in tools, ceremonial objects and weapons dates back to, at least, the 3rd millenium in the Middle East. One of the first ores to be refined was copper. Usually, ovens were constructed where coals covered the ground and large crucibles (made of pottery) with ore in them were placed on top of the coals. The ovens had chimneys to handle the release of smoke from the coals and some of the impurities in the ore. The rest of the impurities were ladled off the top as the ore reached a molten state. Then, the refined metal was ready to be cast or worked by a smith.

Iron smelting was a different matter, since the original product of charcoal-fired consisted of globs of metal with slag in between the metal itself. This low-grade iron had to be both reheated and reworked by a smith (who pounded out the slag) on many different occasions. It was not until the introduction of coke-fired iron (smelted at much higher temperatures) prior to the Industrial Revolution that industrial quantities of iron could be manufactured. Then, the development of steel was not far behind.

Playing Tip: Metallurgy greatly assists any civilization's war effort and anytime you can acquire this technology during a military campaign, you should. The Cannon units which you can build as a result are significantly more powerful than Catapults. Later, you can move along the Steel path with its resultant capability to build Battleship units and move to Automobile to gain Armor units. If you are at peace, Metallurgy is still vital as it opens the path to Electricity, Electronics and Advanced Flight which are intrical to winning the space race and the game.



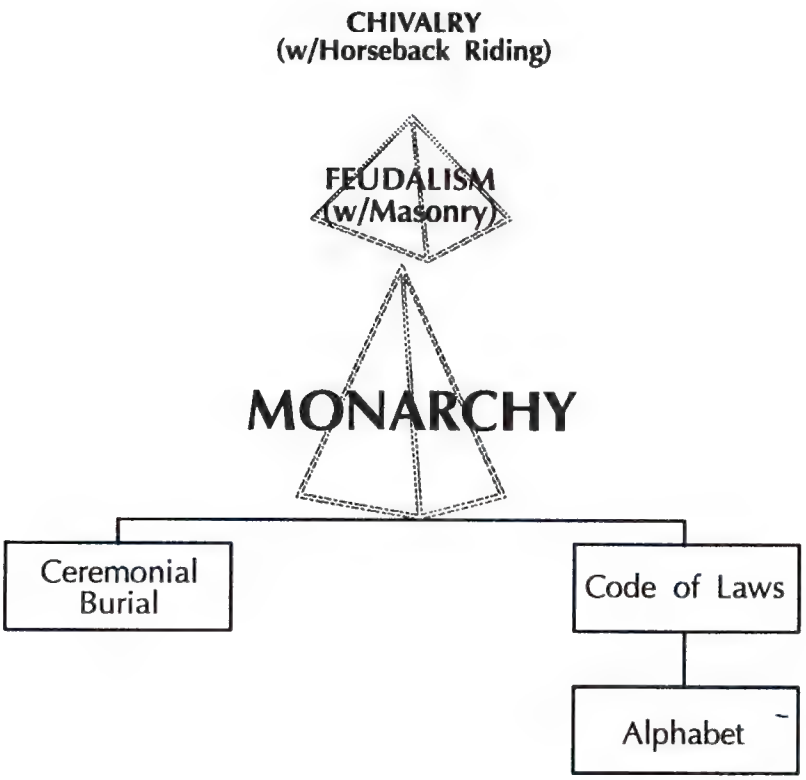
As if being able to replace Catapults with Cannons isn't enough, Metallurgy is also required for discovering both Steel (with its Battleship units) and Electricity (which pushes ahead the space program through Advanced Flight and Electronics). The urgency of discovering this Advance depends on your pressing need for Cannons, as a rule. When in doubt what to research next, Metallurgy is a safe, sure bet on many levels and should be given some priority.

Monarchy

I suppose I'm the man who wouldn't *be king.*
— Edward VIII, Duke of Windsor?

As described in Chapter 6, Monarchy is the next form of government up from Despotism. In its earliest forms, it assumes near-absolute control by one individual who is either perceived as being of divine lineage, appointed by the deity or deities of a tribe or a warrior of demonstrated prowess. Monarchy usually assumes a codified collection of laws, a hierarchy put in place to interpret and enforce the laws and a leader who has the unequivocal loyalty of the great majority, if not totality, of the general population. See the discussion in Chapter 6 for the effects of Monarchy on your civilization in the game context.

Playing Tip: Although the "Pyramid of Progress" for Monarchy seems to indicate that it is strictly a viable choice for nations at war (since it leads to Feudalism, Chivalry and the building of Knight units), it is the most efficient government in the early portion of the game due to the way in which Monarchy enhances the value of irrigation and mining. You will want to place Monarchy on your short list of early advances to acquire.



Arise, ye despots, and achieve divine rights through Monarchy. Not only is Monarchy necessary on the road to Chivalry (and the long term military value of the Knights), more importantly, it is the government of "progress" during the early stages of the game. With Monarchy, irrigation and mining both become useful for city growth and corruption is also reduced a bit. No less important is the fact that Monarchies can declare war on other players at will, ignore their peace overtures and never have to cope with a meddlesome Senate overruling the "divine will." Thus, Monarchy always makes for a good "war government."

Monarchy

Mysticism

You must be myth-taken.

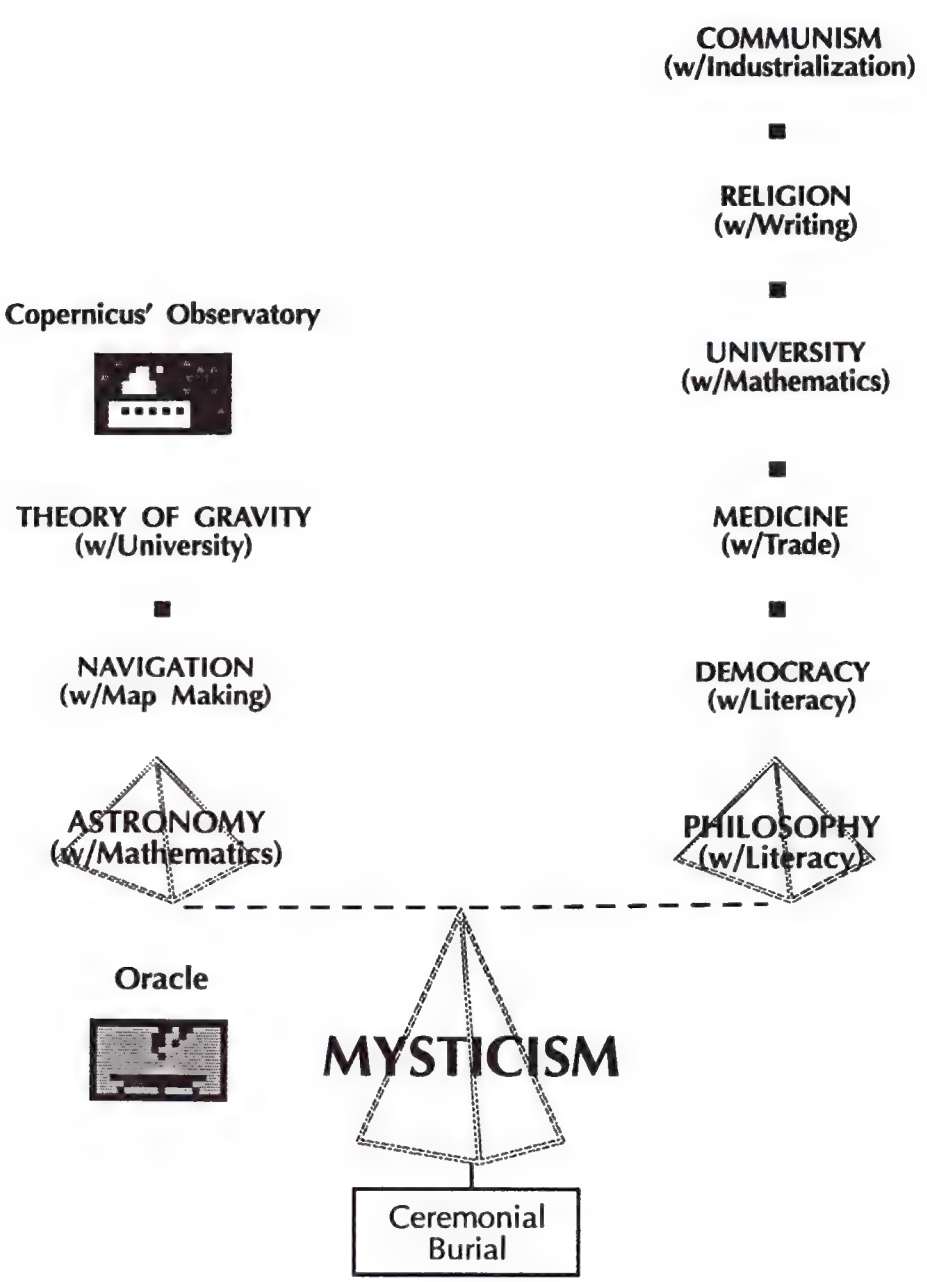
— Joseph Campbell?

Mysticism is the experience or perception of the transcendent, humankind's desire to discover something greater than oneself. Mysticism takes many different forms throughout history, but is probably best summarized in the four characteristics described by William James in his *The Varieties of Religious Experience*. James stated that mysticism relies upon: ineffability, a noetic quality, transciency and passivity. Ineffability or the inability to grasp anything tangible is expressed in those experiences in which an individual speaks of a "dazzling obscurity" or a "whispering silence," terms which admit that the experience is indescribable. The noetic quality means that people who have such experiences usually believe that they have a special word or insight for everyone else. As one wag put it, "Mysticism begins in mist and ends in schism."

Transciency means that the experience doesn't usually last as long as other experiences, so they have to keep coming back for more or seeking a renewed expression of the experience in new traditions or rituals. Passivity means that the adherents of the mystical experience often absolve themselves of responsibility for their own actions (i.e. "The gods told me to do it.") and follow their perceptions of the experience.

In *Sid Meier's Civilization*, Mysticism represents an amalgam of allegedly supernatural traditions which include virtually every form of ecstatic trance, divination and charismatic manifestation. Since many of these traditions were built on supernatural explanations of natural phenomena (astrology, lodestone divination (see Magnetism) and alchemistry), the game allows the Mysticism advance to serve as a stepping stone from superstition to science.

Playing Tip: Mysticism does not *seem* important, at first. Trust us, you will need it in order to advance in terms of exploration by sea, as well as exploration of the mental disciplines. Acquire Mysticism at any early point.



Part religion, part science, it is no wonder that Mysticism helps along both paths. For religion, it doubles the effect of Temples which will now make 2 unhappy people content. Additionally, with the Oracle wonder, Temples double again to making an impressive 4 unhappy citizens content.
For the sciences, Mysticism leads to Astronomy and the great discoveries of Navigation (with its Sail unit) and the (less than exciting) Copernicus' Observatory wonder. Also, the key advance of Philosophy requires the knowledge of Mysticism, making Mysticism doubly important to discover. Forgive the pun, but Mysticism is really "worth a sacrifice."

Mysticism

Navigation

Relax, you're on a cruise.

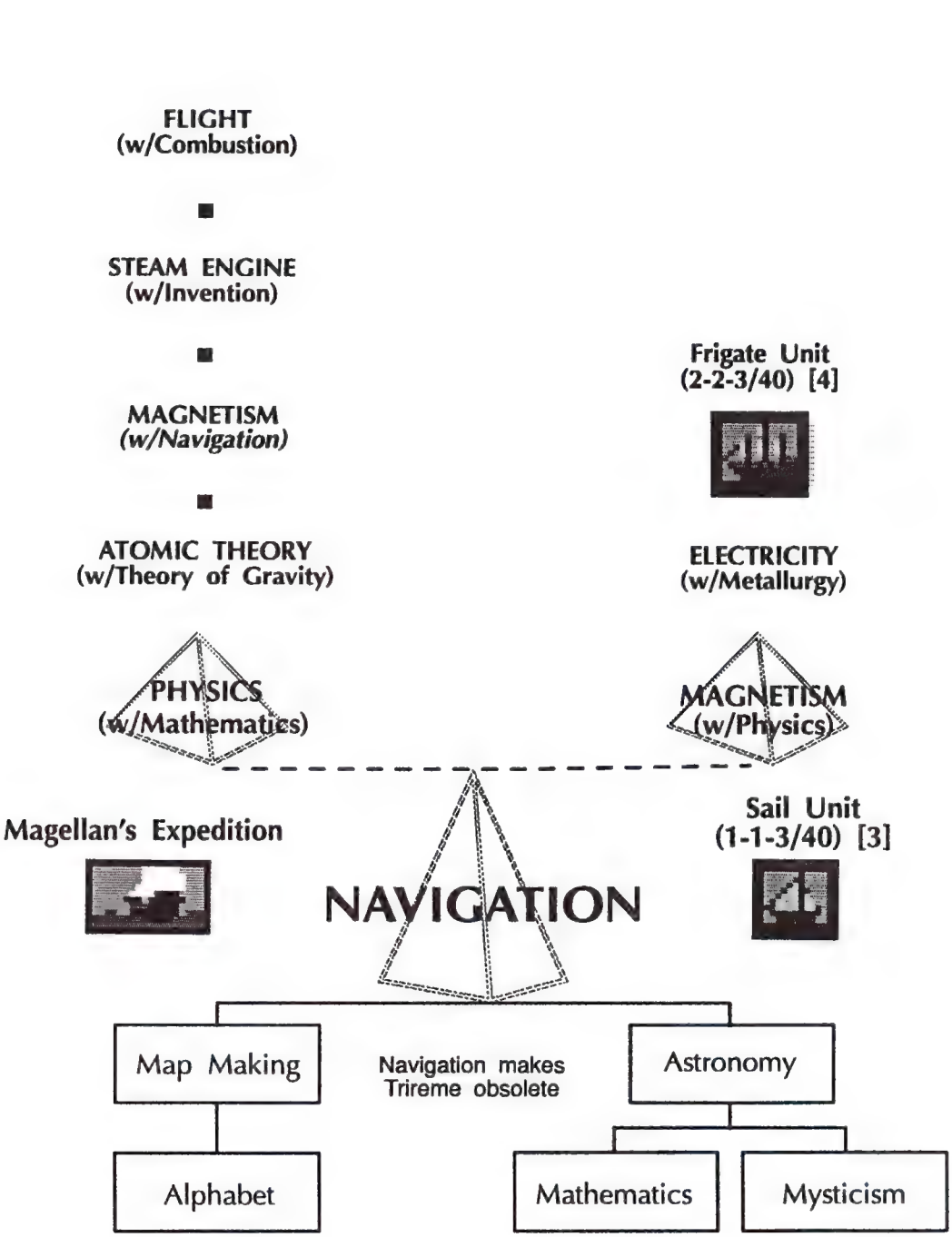
— Christopher Columbus?

As you already read under Magnetism, the Greeks navigated by means of the wind. They had what was called a wind rose that described the different characteristics of the winds from each of four, six, eight or twelve "compass" points. The discovery of magnetism enabled sailors to trade in their wind rose cards or a magnetic compass that could define compass points at eight, sixteen or thirty-two compass points.

As sailors determined direction by means of the compass, the ancient Greeks determined latitude by observing the height of the circumpolar stars above the horizon and comparing the height with tables of various latitudes. By the Middle Ages, these tables were recorded in detailed almanacs and sailors used a Jacob's Staff (two rods hinged at one end to provide an angle of declension). Finding longitude with any degree of exactitude was not as simple. It took Christaan Huygens' invention of a spring-driven marine clock in the 17th century before sailors could have enough of a dependable clock to determine longitude with any exactitude.

In *Sid Meier's Civilization*, Navigation represents the earliest modes of seafaring and leads toward the application of Magnetism and the advanced technologies which the study of the latter will bring. In essence, it expands your civilization's knowledge as fast as it expands the known boundaries of the world.

Playing Tip: Acquire Navigation at an early point in the game and finance the Magellan's Expedition wonder using one of the financial tricks described in Chapter 10 (in order to be sure that one of the computer-controlled civilizations does not get it first). Then, you're ready to use your sea routes for trade or war and advance onward to more modern technologies.



Navigation, like Gunpowder and Industrialization, changes the nature of the game. With Navigation, you can build Sail units and explore the world. In so doing, you can establish far flung embassies, trade routes and empires. Large expeditions, however, are seldom viable under a representative government due to all the "sad faces" created in cities while units are away from home, so Monarchy will probably serve you best as the government of exploration and discovery. Navigation also leads to the important advance of Physics and the Magellan's Expedition wonder is one of the best since it gives every ship an extra movement point and never expires.

Nuclear Fission

That blowed up real good, didn't it?

— Harry S. Truman?

Nuclear fission refers to the splitting of an atom into two pieces (fission fragments). In a nuclear bomb, the detonation sets off a chain reaction in which great numbers of atoms split in an extremely short space of time. The sudden release of energy caused by the fission causes an explosion equivalent to almost 400,000 times the amount of an equivalent weight of chemical explosive. The bombs which were dropped on Hiroshima and Nagasaki were fission bombs, but the nuclear weapons developed since the early 1950s (hydrogen bombs and thermonuclear devices) have been based on nuclear fusion.

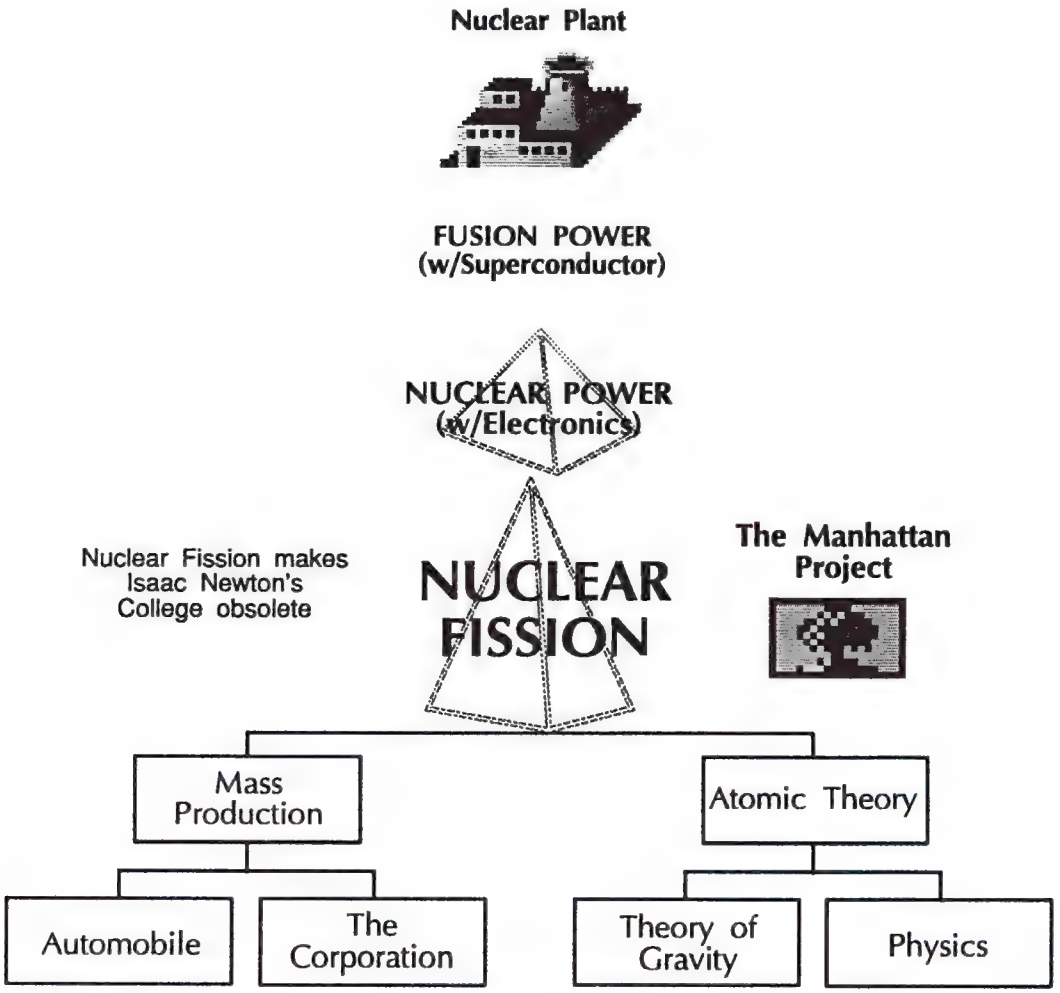
Enrico Fermi established the first nuclear reactor in 1942. This reactor, at the University of Chicago, was the location where scientists discovered that it would require one of two radioactive isoptypes (either Uranium-235 or Plutonium-239) to create a fast enough reaction to power an efficient bomb.

It was also discovered that nuclear reactors were a potentially useful source of energy. In the modern world, the U. S. Navy has a number of nuclear powered submarines that are able to operate at sea over a period of months before replenishing the fissionable materials that power the reactor. In *Sid Meier's Civilization*, Nuclear Fission is the first step toward the, at least in the game, relatively safe use of Nuclear Power and the, best avoided, Manhattan Project wonder (see the discussion in Chapter 8).

Playing Tip: If you have the Isaac Newton's College wonder, you will want to make sure that you are ready to move swiftly forward toward more advanced technologies before you acquire the Nuclear Fission advance. It makes your wonder obsolete and does not move you along the advanced path fast enough to make up for it. Once another civilization gets Nuclear Fission, you had better turn on the light bulbs and get this advance quickly to achieve nuclear parity.

N

Nuclear Fission



When heading down the backstretch of technology, there appears Nuclear Fission. While this Advance turns the lights out at Isaac Newton's College, it does afford you the opportunity to pursue the Manhattan Project (which will allow ALL players with the technology to build Nuclear units). Global thermonuclear warfare aside, the peaceful uses for Nuclear Power will become available with that advance (as will a reduction by 50% of industrial pollution where a Nuclear Plant exists). Ultimately, this will take you to Fusion Power, at which point Nuclear Plants are made completely safe.

Nuclear Power

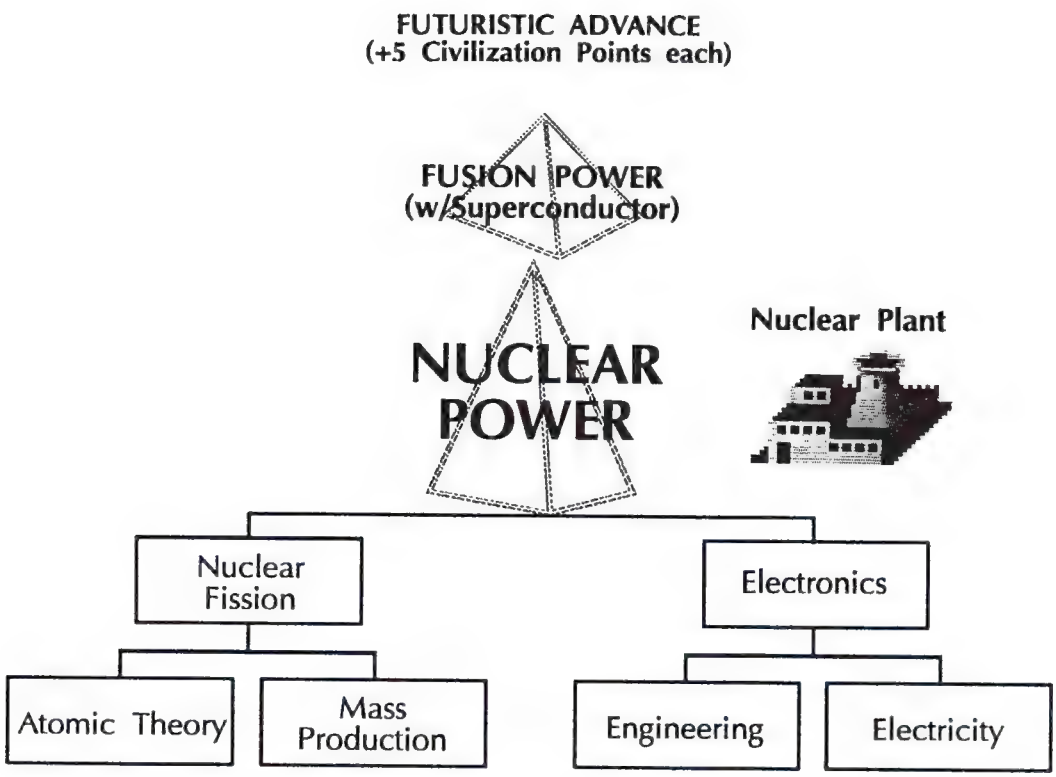
Just blowing off a little steam.
— Three Mile Island press release?

In the 1950s, both government-sponsored and privately-constructed reactors were being built as a result of the second Atomic Energy Act (enacted in 1954). Of course, the rationale behind all of this public and private enterprise was to put the fission process to work in generating a plentiful supply of energy. President Dwight D. Eisenhower called this proliferation of reactors an "atoms for peace" movement and it was to differentiated fom the British approach. The British elected to build carbon dioxide-cooled reactors which produced plutonium for nuclear weapons while generating enough heat to be converted into energy as a by-product. This type of reactor was not efficient enough for energy production alone, but the dual purpose was acceptable to the British government and the U. S. followed suit in 1958 when wishing to expand their nuclear stockpile.

As noted in Chapter 4, *Sid Meier's Civilization* takes an extremely optimistic view of the use of Nuclear Power in the production of energy. For a brief summary of the differences in the perspectives on the use of Nuclear Power between the authors of this book, see those pages.

Playing Tip: In *Sid Meier's Civilization*, Nuclear Power is clean and cheap. You would be extremely foolish not to move this advance to the top of your list as soon as it becomes available. You have nothing to lose (unless, of course, a city which has one of your Nuclear Plants goes into Civil Disorder) and plenty to gain (in terms of reduced pollution and power at a cheaper price). Build Nuclear Plants as soon as possible and help pay for them by selling back your local Hydroelectric Plant when the funds you would collect by selling it will enable you to finish paying for the Nuclear Plant.

N



Nuclear Power is often achieved as you head for the wire in the technology race. Providing Nuclear Plants, however, is its only real function. This power source, like the Hydro Plant, cuts industrial pollution by 50%. However, Nuclear Plants cost only half as much to maintain (at $2 per turn). Although there is a risk of meltdown if a city with a Nuclear Plant goes into disorder, this threat is completely eliminated with the discovery of Fusion Power.

Philosophy

I don't think. Therefore, I'm not.

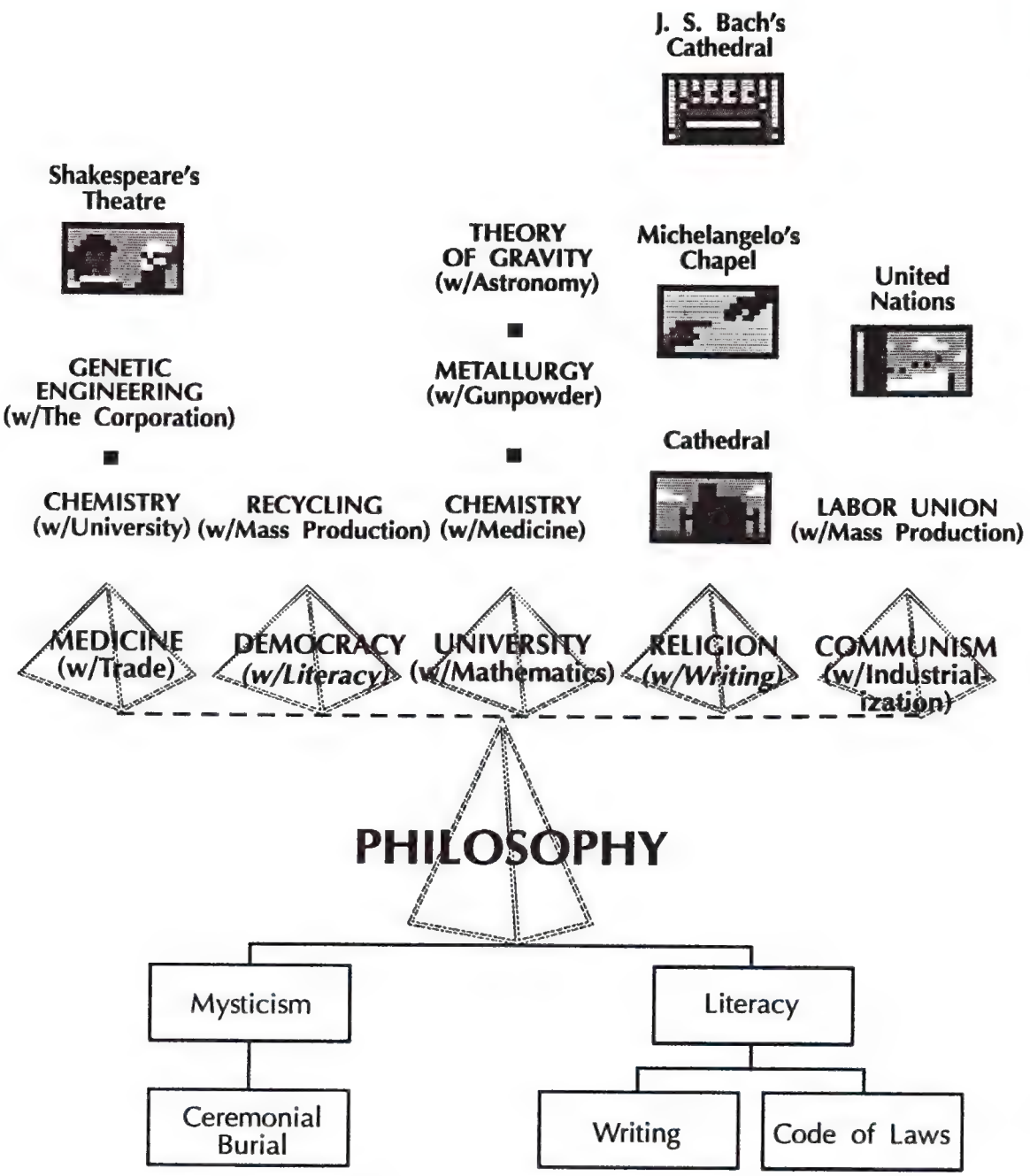
— Jean-Paul Sartre?

Philosophy is the discipline of examining the whole world from a logical perspective. The ancient Greeks used the Socratic Method, which asked questions in order to ascertain the similarities and differences in opinions, ideas, claims and observations. After a series of questions, the Socratic philosopher would present his conclusion. Over the course of centuries, philosophy has come to mean the logical examination of all ways of knowing the world through a systemized perspective of considering claims and counterclaims. This discipline in viewing the world has enabled humankind to consider multiple bodies of knowledge according to more strenuous rules of evidence. In turn, this has expanded the realms of almost all areas of inquiry.

In *Sid Meier's Civilization*, Philosophy directs your civilization on the path of higher sciences through the Medicine and University tracks and on a pilgrimage to affirm human worth through Democracy, Religion and Communism. It can assist your citizens in being happier with their lot in life (Religion), enable you to get the most productive government in the game (Democracy) or accelerate your accumulation of technology (Medicine and University).

Playing Tip: Obviously, Philosophy is of little use when your civilization is at war. It is a priority advance when you are at peace, however. It opens so many new avenues that you cannot afford to hold off on acquiring this excellent peacetime discipline whenever it becomes available.

P



As the portal to so many concepts, Philosophy is an important advance for non-military matters. While not every one of its branches is a prize, certainly Democracy (the highest form of government in the game) and Religion with its low maintenance Cathedrals (at $3/turn) which keep so many unhappy people content (4) are winners. Philosophy is a lynchpin discovery which opens wide the possibilities for future Advances. With so much to gain, you are certainly urged to adopt an eager attitude towards acquiring this critical Advance (philosophically speaking, of course).

Philosophy

Physics

For every action, there is a satisfaction.

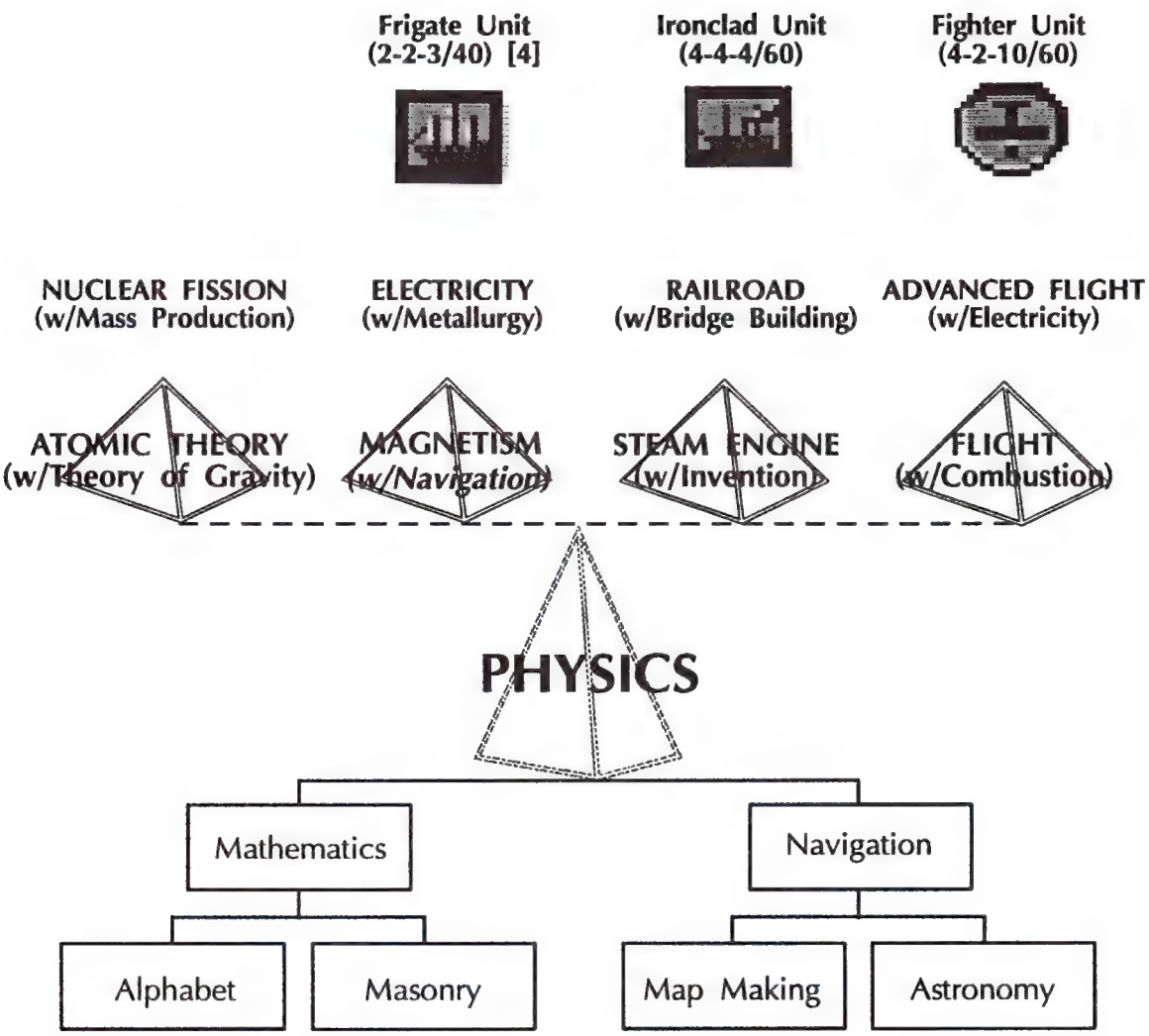
— Epicurus?

We live in a world of matter and motion. Indeed, perhaps it would be more accurate to state that we live in a world of matter in motion. Physics is the science that enables you to talk systematically about both matter and motion. In the ancient world, much of physics was speculation. As Landels commented in *Engineering in the Ancient World*, the Greeks understood velocity and relative velocity, but had no concept of inertia or kinetic energy. The Greek thinkers who were interested in physics attempted to posit abstract theories in order to develop a unity in understanding the physical world.

Physics did not remain a rational or theoretical science, however. It became an experimental science which allowed its practitioners to test their theories in demonstrations of mathematical formulae, as well as experimentation, and to build general theories from that experimentation. In general, then, the field of physics has come to include: astronomy, mechanics, optics, acoustics, thermodynamics, magnetism and electricity.

Then, from these sub-disciplines, modern physicists have tried to create a unified theory in which the properties of all matter are tied together. In the 19th century, physics looked to thermodynamics to connect different phenomena under the rubric of energy release. Before the end of that century, James Maxwell was able to pull matters together more effectively with his theories of electromagnetism. Then, in the 20th century, Albert Einstein developed the special theory of relativity. Yet, the advance of knowledge with regard to sub-atomic particles has left us farther from a unified theory instead of closer.

Playing Tip: In *Sid Meier's Civilization*, you do not have to come up with a grand unified theory to benefit from Physics. You simply *have* to acquire it in order to get the Steam Engine, Magnetism and Flight advances.



Physics IS the advance of science. All the wonders of atomics, Magnetism, Electricity, the Steam Engine, Railroad and Flight hinge on Physics. With so much at stake, what are you waiting for? Only an urgent need to research another Advance (due to a civil or military emergency) should superceed the quest for Physics and all the opportunities it holds for later in the game.

Plastics

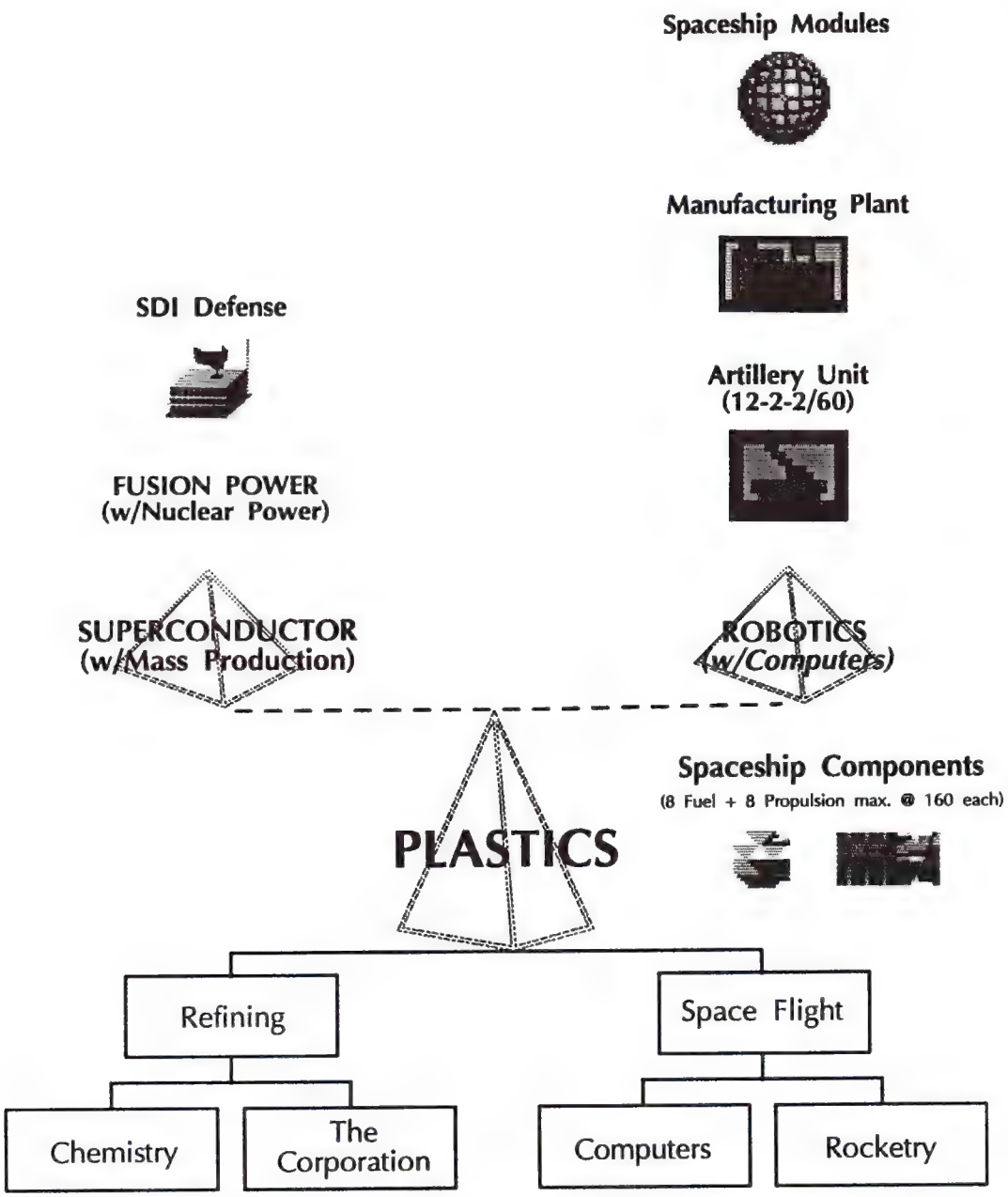
Is that what you are or what you make?
— Benjamin Braddock, *The Graduate*?

Parkesine, Celluloid and Bakelite were all early names of synthetic materials which could be heated, formed and milled into substitutes for natural materials. The term, "Plastics," originates in the Greek verb *plastos*, "made up" or "formed." Though the polymers which serve as necessary building blocks for the manufacturing of plastics can be gleaned from the breakdown of linseed or vegetable oils, combination of milk and formaldehyde, nitration of cotton fibers or carbonization of coal, the bulk of polymer production in the modern world is a by-product of the petro-chemical industry.

In *Sid Meier's Civilization*, the proliferation of manufacture and widespread use of Plastics is a result of the space program. That is why you cannot obtain the Plastics advance until *after* you have attained Space Flight. Even though the advance comes later in the progression of the game than it arrived on the scene in history, Plastics is still absolutely vital to winning the game. You *cannot* build Spaceship Components without Plastics technology.

Playing Tip: When you are able to obtain Plastics technology, you have definitely reached the latter stages of the game. The Plastics advance is absolutely worth pursuing immediately whether you are at war or at peace. At war, it can help you obtain the most powerful defensive improvement (the SDI Defense) and the most powerful offensive unit (the Artillery unit) in the game, as well enabling your civilization to accelerate your program to attain Space Flight.

P



While Plastics leads to either the ultimate offense on land and the ultimate resource generator (through Robotics with its Artillery unit and Manufacturing Center, which gives a 100% increase in a city's shield production) or the ultimate city defense (through the Superconductor advance with its SDI Defense), all is not wonderful with discovering Plastics. Plastics raises population pollution to its highest level at 100% (i.e., 1 Population Point = 1 Pollution Point or "smokestack") which can get messy if you don't have Mass Production (and its Mass Transit improvement). Note that Spaceship construction requires someone to have built the Apollo Program wonder.

Pottery

This is like putty in my hands.

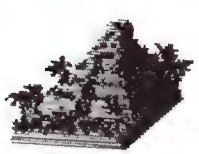
— Auguste Rodin?

Pottery is one of the most important early advances because it provided for the transport, storage, cooking and serving of food. Pottery is so ubiquitous in early civilizations that archaeologists analyze pottery and compare the styles and characteristics of pottery with a reference on pottery typology in order to help date various sites and layers. Because pottery is practically omnipresent in early settlements, it is one of the best pieces of physical evidence to use in dating sites. In addition, many pieces of pottery which have been recovered by archaeologists have had some type of food residue in them which, in turn, has allowed us to know more about what types of diets were used by various civilizations.

The earliest forms of pottery, of course, were made from slabs of clay in which the craftsperson would depress the center of the slab until there was enough of an indentation to serve his/her purpose. From there, it was not too great a leap to the method many of us learned in elementary school. In the ring method, you roll out cylinders of clay and curl them up in rings, one on top of the other. Once you have the general outline of the vessel, you can smooth the outside. Naturally, the manufacture of pottery took a grand leap forward when the potter's wheel arrived on the scene and when civilizations like the Etruscans used molds to produce uniform vessels.

Playing Tip: Pottery is usually your best bet as an initial advance, since it allows you to build the all important Granary improvement. Even though Pottery seems like a technological cul-de-sac, don't underestimate it.

Hanging Gardens



Granary

Pottery

With the possible exception of the Alphabet, Pottery should be a primary Advance to research. While it leads nowhere, Granaries are a vital improvement required in every city. Not only do they speed city growth by retaining half the food in the Food Storage Box when the population increases, but they also prevent the famine disaster from occuring where built.

The Hanging Gardens wonder is okay, but it is of greater value at higher difficulty level games where unrest hits every city with its third or fourth Population Point.

Unfortunately, it expires fairly quickly with the discovery of Invention.

Railroad

If I build it, they will go.
— Cornelius Vanderbilt?

In 1804, Richard Trevithick built the first steam locomotive to run on rails and successfully used it to pull a heavy coal train along the Penydarren Tramroad in Wales. It was not until 1812, however, and somewhat coincidental with James Fenton's development of the spring-loaded safety valve, that regular commercial steam locomotives entered regular colliery service in Middleton. This service was followed in 1813 by Christopher Blackett's construction of the *Puffing Billy* and *Wylam Dilly* to service to Wylam Colliery near Newcastle.

So, it is easy to see how, from the initial inception of railroads, they assisted the mining industry in getting the raw material to market. So, it is no wonder that *Sid Meier's Civilization* offers a bonus, in terms of production, for any square which contains a Railroad.

Railroads did not, however, simply carry goods. However, it was 1825 before a railroad served both the function of carrying goods *and* passengers. This was the Stockton and Darlington Railway, complete with locomotives built by George Stephenson. To reflect the revolutionary aspect of passenger traffic on the railroads during the Age of Industrialization, *Sid Meier's Civilization* allows you to move units at a significantly reduced rate.

Playing Tip: You should not only acquire the Railroad advance as a means of spurring Industrialization, but you should get it to enhance the production of every terrain square which is under irrigation or mining. This will significantly beef up your civilization's income and will enable you to create a transportation infrastructure that can help you mobilize troops more efficiently, should your civilization be attacked. You can even build Railroads on the ocean in order to increase trade and food production (See Chapter 10).

Factory

Women's Suffrage

Transport Unit
(0-3-4/50) [8]

STEEL
(w/Metallurgy)

THE CORPORATION
(w/Banking)

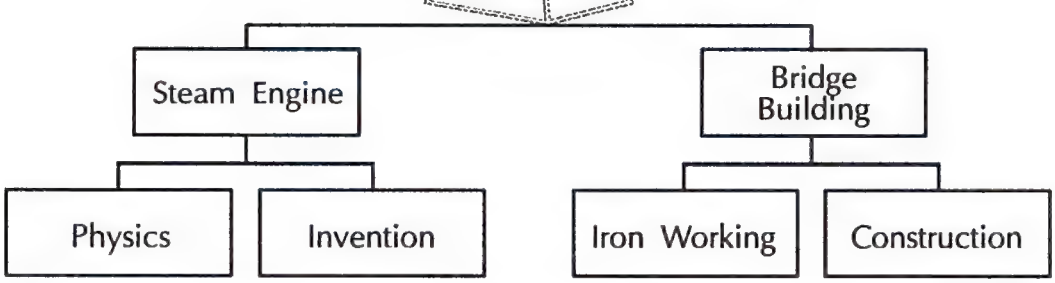
COMMUNISM
(w/Philosophy)

INDUSTRIALIZATION
(w/Banking)

Railroad allows Settlers
to construct railroads

RAILROAD

Darwin's Voyage



The bullet train to the big time begins with the Railroad. Costing zero Movement Points to traverse, your empire can be more easily defended by the ability to rush troops between threatened cities with great ease. More importantly, Railroads improve the production of the squares in which they are built by 50% (rounded down), which will cause renewed and rapid urban growth. The Darwin's Voyage wonder will give you whatever is currently being researched, plus one other Advance, and marching on to Industrialization with its Factory improvement and Women's Suffrage wonder is absolutely the right way to go. Take the Railroad! All aboard!

Railroad

Recycling

Can it.

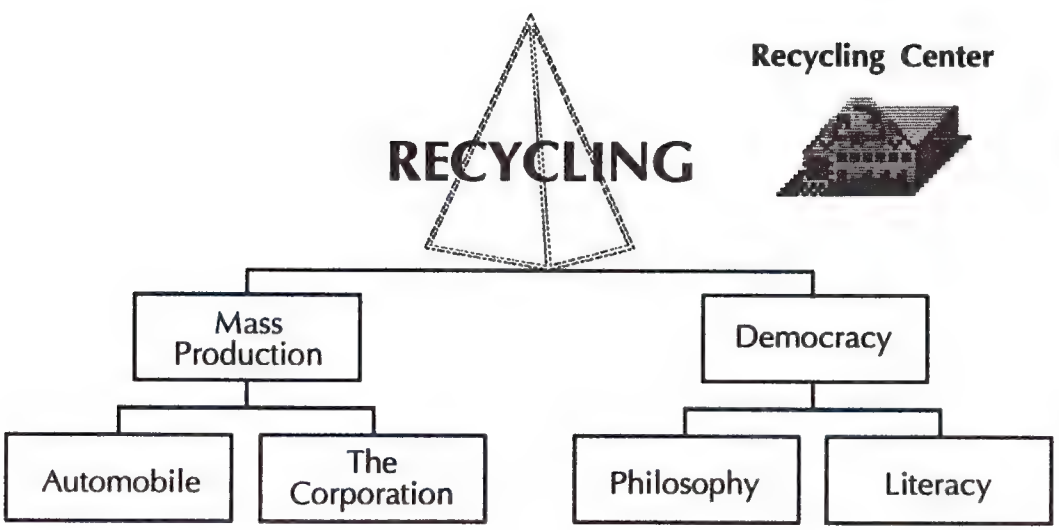
— R. Buckminster Fuller?

Recycling is, of course, a rather modern phenomenon which has originated from the heightened awareness that the Earth has a fixed amount of resources. So, in the words of R. Buckminster Fuller, "There is no such thing as a free lunch." Recycling is a process that allows you to separate trash so that you have an accumulation of items made out of the same base materials (i.e. paper, glass or aluminum). Then, you reduce those items down to their base materials and reuse the base materials in other products.

In *Sid Meier's Civilization*, the Recycling advance makes it possible for you to build a Recycling Center and reduce pollution, *but* the Recycling Center does not put any shield units back into a city's account in order to represent the reuse of the base materials. This means that the Recycling Centers only represent part of their "real world" function in the game (i.e. reducing pollution).

Playing Tip: Although Dr. Wilson is a firm believer in conservation efforts, the truth is that the Recycling advance is simply not worth the effort in game terms. You should avoid it unless you have severe pollution problems.

R



This is a dead end, one-shot Advance with but a single purpose; to allow you to build Recycling Centers. While a Hydro or Nuclear Plant (or the Hoover Dam, for that matter) will reduce the industrial pollution equasion by 50%, a Recycling Center takes that a bit further and reduces industrial pollution by 67%. Thus, only one shield in three produced by a city adds to the city's "smokestacks" when a Recycling Center is located there. For resource rich cities being supplemented by Factories or Manufacturing Plants plus a power source, a Recycling Center can cut down on the pollution output dramatically, but in most cases isn't really very necessary.

Recycling

Refining

Sir, you are crude, rude and unrefined.
— John D. Rockefeller?

Refining of petroleum products was developed around the middle of the 19th century. In Pennsylvania, refiners would place crude oil in stills and run it through a distillation process until they got enough kerosene to sell on the open market. Toward the end of the 19th century, refiners received a bonus as the rise in automobile use called for some of the light by-product of the distillation process as a fuel for the new vehicles.

During the early part of the 20th century, refiners discovered that heating the crude under high pressure (called "cracking") was not only more efficient than distilling it under the old process, but it created a higher grade of gasoline to sell to automobile drivers, as well. This was a fortuitious discovery, since automobile ownership was increasing at a rapid pace and the lighter fuel was coming more into demand at just the time when the process was revised.

This method of "cracking" was superseded during World War II by a new process called "catalytic cracking." Under this technology, chemicals that were known to catalyze the crude were added to the refining process. This resulted in an even higher grade of fuel which was, in turn, used for high performance aircraft during the war.

Playing Tip: In *Sid Meier's Civilization*, Refining not only allows you to build Power Plants and increase your production by 50% in each city where you do so, but it also directs you to two new paths of high-tech advancement. You will definitely need to select Refining at your earliest convenience.

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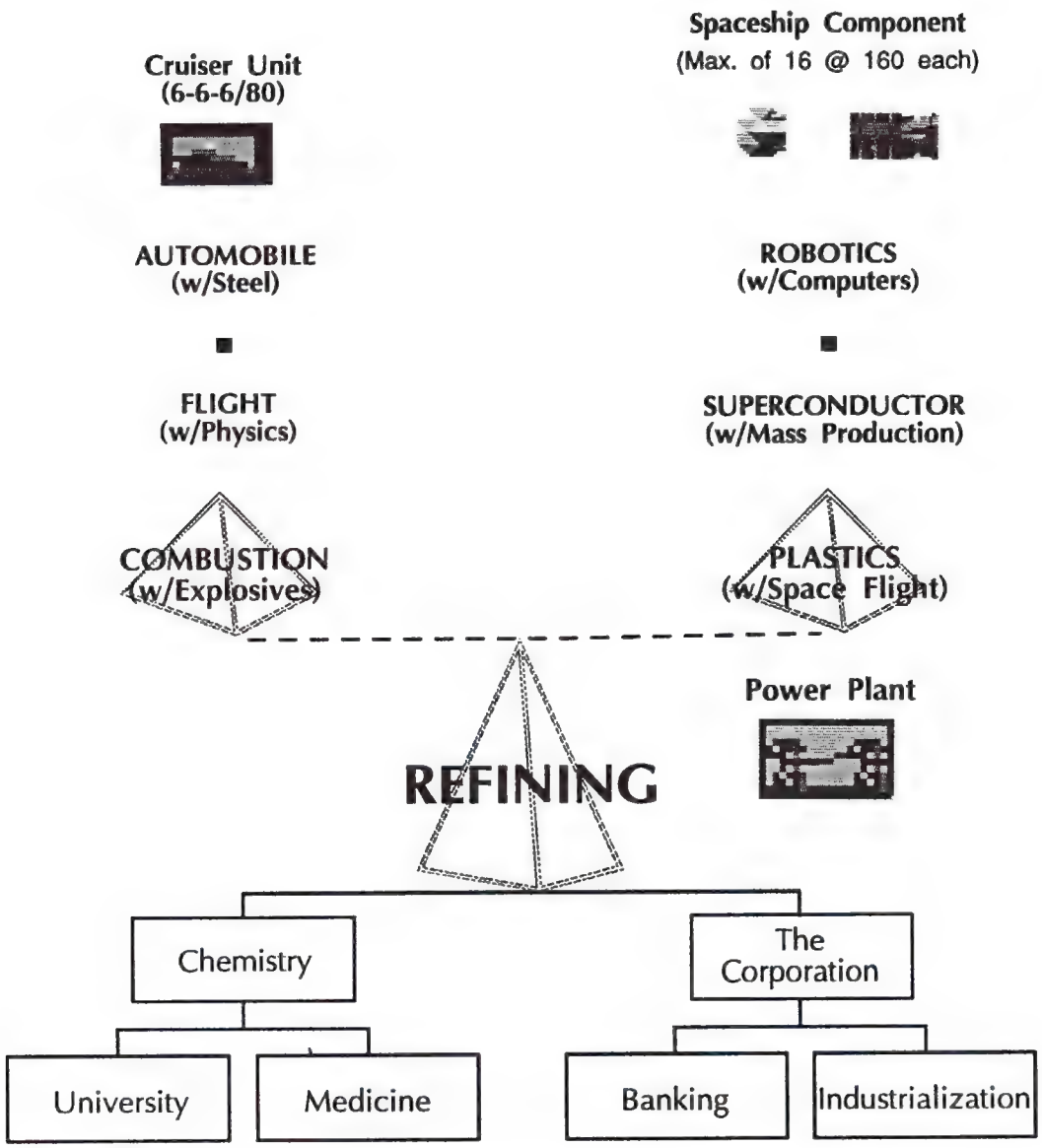


Refining is often perceived as middle step on the road to Combustion, which leads to the important Advances of Flight (with its Fighters) and the Automobile (with its Tanks). In effect, Refining bridges the gap between 19th and 20th century technology. However, Refining also provides the first power source which is available to all cities, the Power Plant. Its description on page 80 of the rules book is completely wrong in asserting that Power Plants "increase... pollution significantly." In fact, they have no effect on the industrial pollution formula except to increase a city's base shield production by 50% (like every other energy source).

Religion

I have a whale of a testimony.
— Jonah

Religion is an organized system of doctrine and ritual which enables humankind to perceive a transcendence beyond the life of the individual. As noted in the discussion of Ceremonial Burial, the belief in some form of afterlife (albeit sometimes little more than the shadowy and weak existence represented in the Sheol of the Hebrews and the Hades of the Greeks) seems endemic to human society. So, priestly hierarchies built their authority on this belief in an afterlife and controlled much of the population with the fear of breaking taboos that could jeopardize that afterlife.

In the Middle East, such priestly power was used to direct entire populations in constructing public works projects (like granaries and irrigation canals) that would benefit entire populations. In addition, religion served to produce the foundational myths and rituals that gave meaning to the life of primitive citizens, helped the acculturation process take place within the civilization and provided the comfort of the familiar (ritual) in times of loss and disappointment.

As noted in Chapter 4, however, *Sid Meier's Civilization* primarily uses religion as a placebo and really offers no requisite benefits from the acculturating, moral producing and cooperative labor aspects of primitive religion. Rather, religion becomes obsolete as the game turns the corner into the modern era.

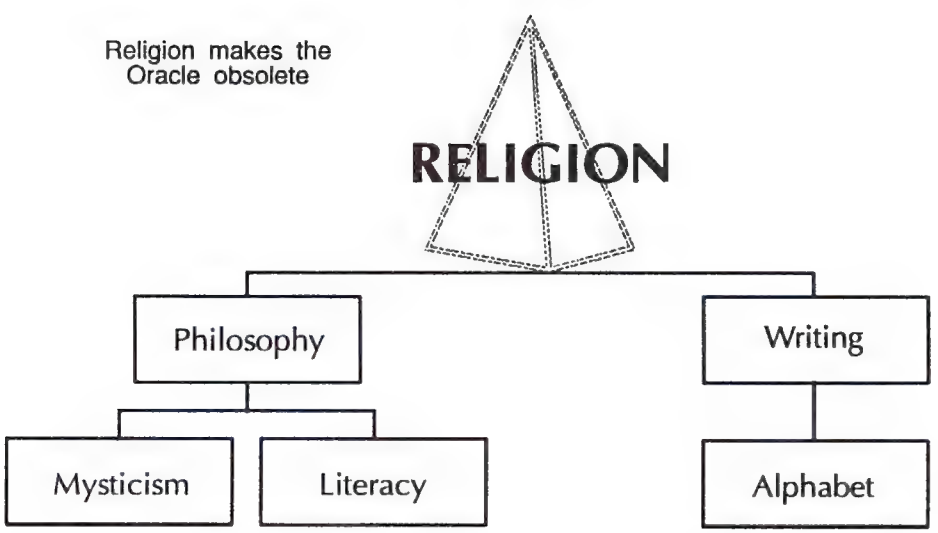
Playing Tip: Religion is a worthwhile advance during the early to middle portions of the game. If you haven't needed to acquire it prior to Industrialization, though, you don't really need it. Early on, however, both Michelangelo's Chapel and J. S. Bach's Cathedral are well worth the cost. See the separate discussions on these wonders in Chapter 8.

R

Michelangelo's Chapel

J. S. Bach's Cathedral

Cathedral



Although a "dead end" technology, Religion is crucial for growing civilizations since it placates urban unrest. Although a Cathedral improvement costs more shields than a Colosseum (160 vs. 100), because it makes more unhappy people content (4 vs. 3) and costs less to maintain (3 coins vs. 4), in the long run, Cathedrals are a better value. It is also "out" with the old religious wonder (the Oracle) and "in" with the new. Both of the new wonders are useful for reducing unrest, but especially so for representative governments with troops away from their home cities. To solve the long term problems of civil unrest, build Cathedrals and spread "the Word."

Robotics

Walk like a man!

— Isaac Asimov?

In the discussion on Engineering, we mentioned Hero, the Mechanical Man from classical Alexandria. Hero is reputed to have created several mechanical puppets which were pneumatically driven, including birds that flew. After Hero, we do not really hear of mechanical men until we reach Europe of the 18th century. Then, clockmakers would enhance their designs by incorporating figures that played music by means of the clockworks built into their design.

In the modern world, the illusion of life has been enhanced in the world of audio-animatronics by having a computer drive the hydraulic valves and electronic servos of life-like humanoid (and animated cartoon) characters such as those at Disneyland and other amusement parks.

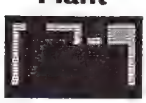
In *Sid Meier's Civilization*, however, the Robotics advancement does not refer to the creation of androids. Rather, the advance is built on the idea of mechanical arms that can perform repititious duties more efficiently than human laborers are able to perform them. So, obtaining the Robotics technology allows you to produce goods and weapons more efficiently. The Robotics advancement is also necessary for your civilization to be able to accomplish the low-tolerance work necessary to complete Spaceship Modules required for the Alpha Centauri expedition.

Playing Tip: When at war, you should select the Robotics advance in order to be able to build Artillery units. When at peace, you will want to achieve this technology in order to build Manufacturing Plants. The latter gives you a 100% increase in shield production.

R

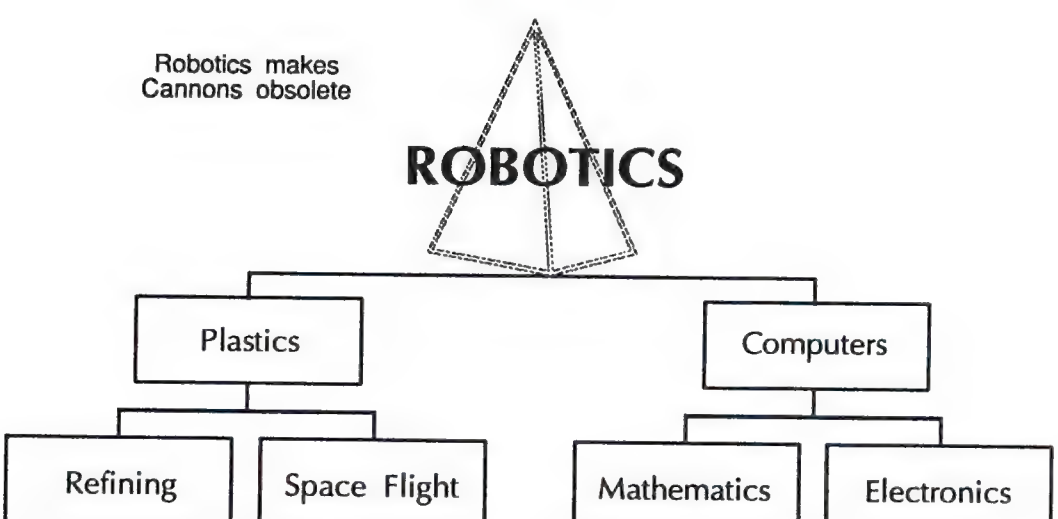
Spaceship Modules
(4 Habitation + 4 Life Support +
4 Solar Panels max. @ 320 each)

Manufacturing Plant



Artillery Unit (12-2-2/60)

Robotics makes Cannons obsolete



Life is good with Robotics. In war, the best offensive ground unit in the game is Artillery (which ignores City Walls when attacking). Don't level homes without them. For the economy, Manufacturing Plants, while expensive to build (costing more than some wonders at 320 shields) and maintain (6 coins per turn) provide a 100% increase in a city's base resource production and supercede Factories. Thus, they make a valuable addition to cities with large resource outputs. Finally, in order to earn Civilization Points in space, you must send Modules. While also very costly, at this late stage of the game, who cares? Acquire Robotics as soon as possible!

Rocketry

I just love those Rockettes!

— Robert Goddard?

Although smaller experimental rockets, anti-tank ordnance and even the use of rocket-launched whaling harpoons preceded the German rocketry program of World War II, it was that German program that really generated the technological sophistication necessary to drive a space program. The V-1 rocket, usually called a "buzz bomb," was powered by a jet engine. Yet, it was analogous to primitive naval torpedoes because once launched, it could not be steered.

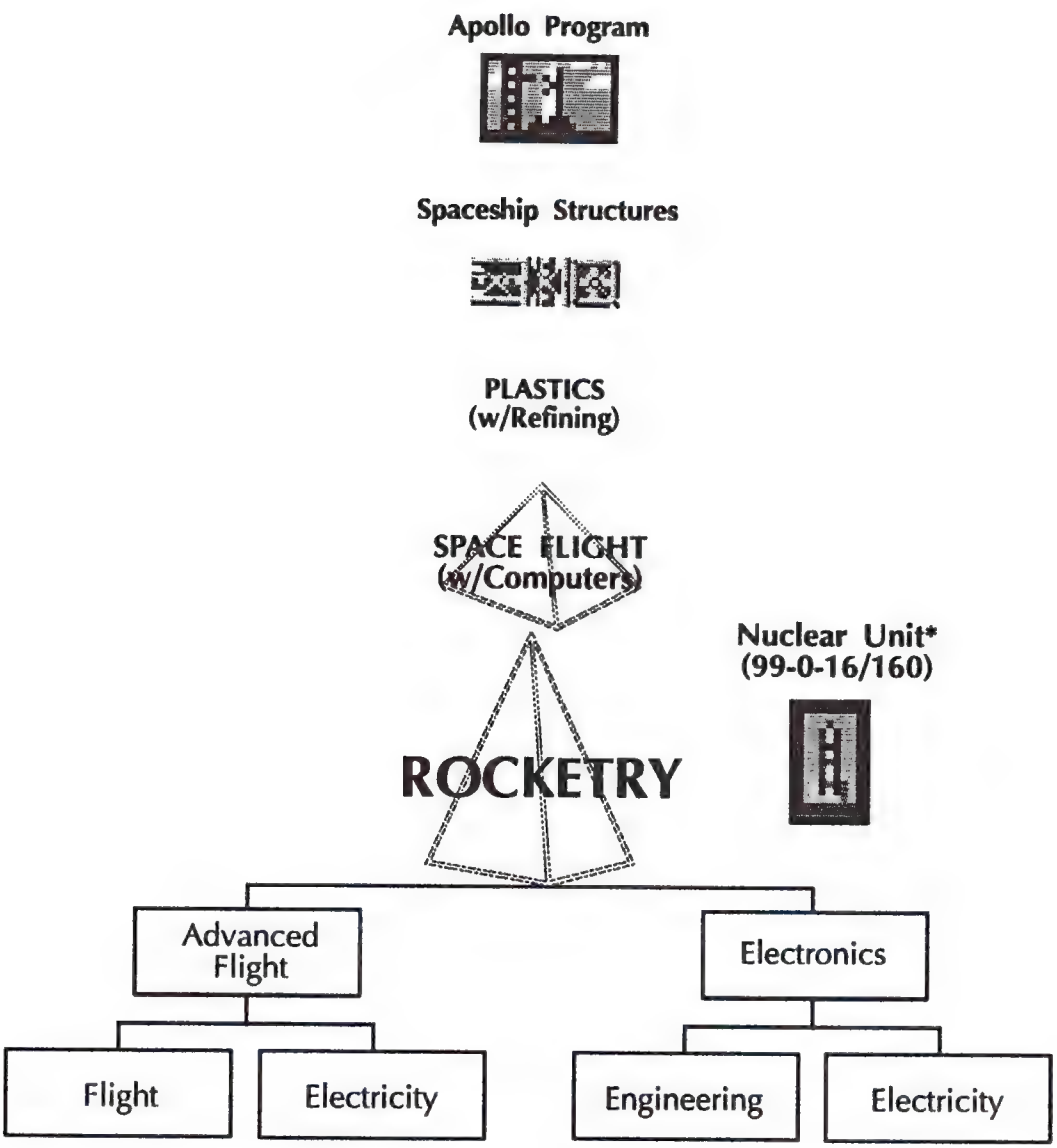
The real advance came with the development of the so-called "Vengeance Weapon 2" or V-2. This was a liquid-fuel rocket that could travel around 100 miles and deliver its warhead.

After the war, the United States and Britain vied for recruiting German rocket scientists and scavenging the parts of V-2s. Indeed, the U.S. scientists became used to handling rockets from their post-war experiments with the V-2.

So, by the 1950s, the Atlas and the Titan rockets were able to take advantage of the miniaturization of guidance systems such as the gyroscope and to offer promise of near pin-point delivery of thermonuclear devices. From the work with these two types of ICBMs, the National Aeronautics and Space Administration was able to fashion a launch system for manned spacecraft.

In *Sid Meier's Civilization*, the Rocketry advance represents the period in the late 1950s as the test flights of Titan and Atlas ICBMs, combined with successful launches of numerous satellites, had proven that the U.S. had dependable launch vehicles.

Playing Tip: Once Rocketry is available for you to choose, you are already in the space race. So, you might as well select this advance and crank up the light bulbs so that you can get ahead of the computer-controlled civilizations as you're reaching the homestretch of the game.



*Available only after the Manhattan Project wonder has been built.

The last milestone before Space Flight, Rocketry also unleashes the devastating Nuclear units (after any civilization builds the Manhattan Project wonder). Players are wise to continue to aggressively pursue their space program after the discovery of Rocketry, since the only things that can prevent nuclear devastation are the SDI Defense improvements available down the road with Superconductor technology. Remember, NUKE OTHER PLAYERS CONSERVATIVELY! Every polluted square you can see is another negative ten Civilization Points and another fine mess you've got to go clean up before "global warming" permanently screws up the whole planet.

Space Flight

The moon is one of the few places you can get a good tee time without reservations.

— Alan Shepard, Jr.?

The Soviet space program got off to a fast start and took an early lead in the space race. The Vostok I which carried Yuri Gagarin into orbit (April 12, 1961) was larger than the boosters which would be used by the United States, primarily because it had been designed to launch a much bigger, heavier warhead than the U.S. ICBMs were expected to launch. In fact, the Soviets kept a cosmonaut in orbit (Titov, August 6, 1961) for over 24 hours before the U.S. had accomplished more than two short suborbital flights. Indeed, the Soviets also were the first to have a woman in space (1963), a three-man crew (1964) and to perform extra-vehicular activities (1965).

By the end of 1965, however, U.S. astronauts were setting endurance records and by 1966, accomplishing the first docking of two vehicles in space. By 1968, the U.S. had accomplished the first manned orbit of the moon and, of course, on July 12, 1969, negotiated the first manned landing on the lunar surface.

In *Sid Meier's Civilization*, the acquisition of Space Flight technology puts you at the start of your Apollo Program. Once you have acquired the Space Flight technology, you can build the Apollo Program wonder (see Chapter 8) and move into the realm of more advanced technologies.

Playing Tip: Do not hesitate to acquire the Space Flight advance once you have obtained the Rocketry advance. The technological track you advance upon once you have discovered Space Flight is the one that will lead you to victory, as long as you keep advancing as swiftly as possible (so the computer-controlled civilizations cannot catch up).

S

Space Flight

Spaceship Components

ROBOTICS
(w/Computers)

SUPERCONDUCTOR
(w/Mass Production)

PLASTICS
(w/Refining)

Apollo Program

SPACE FLIGHT

Spaceship Structure
(39 max. @ 80 each)

Computers

Rocketry

Mathematics

Electronics

Advanced Flight

Electronics

Space Flight exists primarily so that players can build the Apollo Program wonder. Like the Manhattan Project, once built by ANY player, it allows every civilization in the game with the technology to enjoy its benefits. Specifically, the Apollo Program allows every civilization to begin construction of its space ark. The discovery of Space Flight is no place to rest along this path, however. Two advances further down this path lies Robotics, which not only is required to complete a space ark, but also gives you Artillery units and Manufacturing Plants. Try to keep trudging up the mountain and head for Plastics next whenever possible. 10, 9, 8, 7. . .

Steam Engine

I'm not full of hot air!

— James Watt?

Though there were steam engines prior to the one built by James Watt in 1765, none had been as efficient to that point as Watt's became. Watt's steam engine kept both the cylinder and the piston at steam temperature while the engine was running. Since this eliminated a step from the previous steam engines (because the cylinder and piston no longer had to be cooled with each stroke), the costs of operating Watt's engine was significantly less than the costs of operating earlier steam engines.

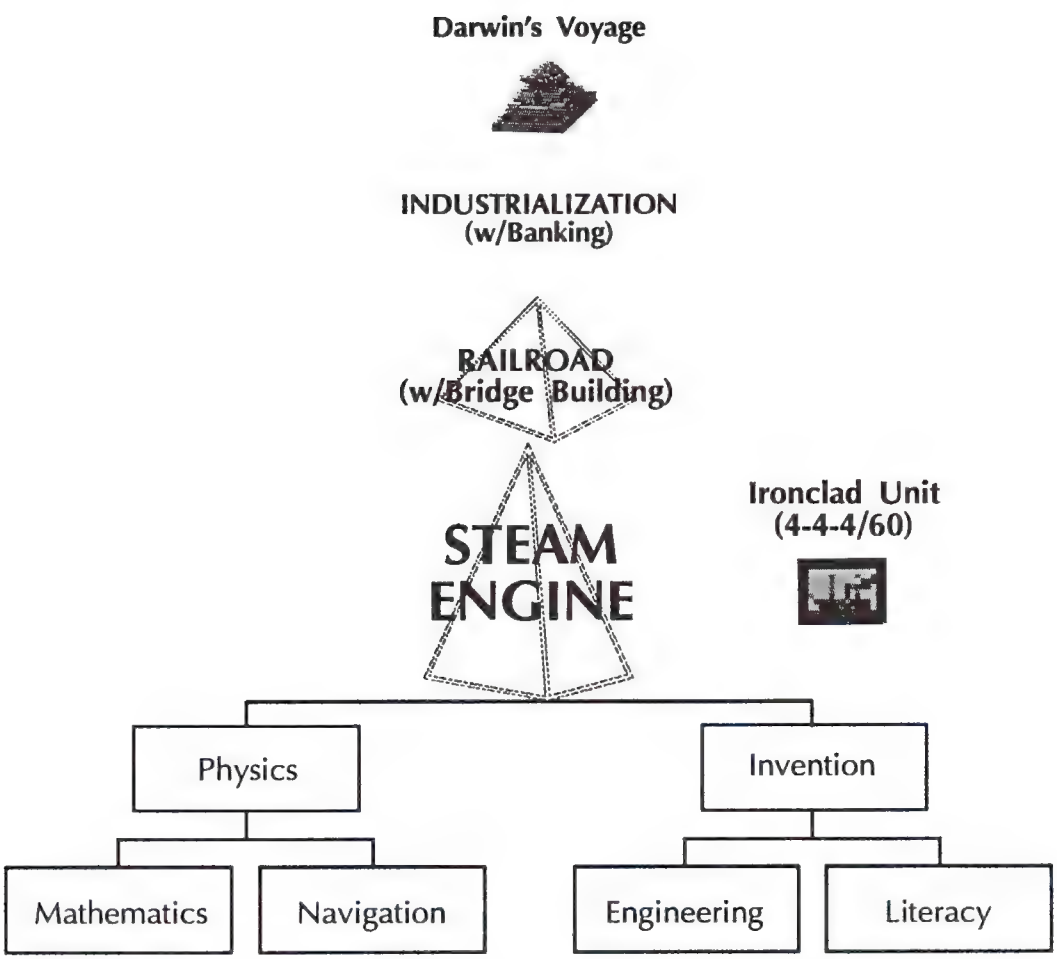
Watt was granted a patent on his steam engine design in 1775 and the patent was good for 25 years. This gave Watt a tremendous advantage as Britain was gearing up for the Age of Industrialization. Also at the close of the 18th century, Richard Trevithick was developing a steam engine to power his locomotive (See the discussion on Railroad) and John Fitch was building steamboats. Later, at the beginning of the 19th century, Robert Fulton was to build the first steamboat in the U.S. (the *Clermont*).

The development of Steam Engine technology in *Sid Meier's Civilization* represents that epoch just prior to the invention of steam-powered vessels and the Age of Industrialization. In fact, Steam Engine technology is required prior to obtaining Railroad technology, gaining the Industrialization advance or building Ironclad units.

Playing Tip: Although the "Pyramid of Progress" for Steam Engine technology only shows one track for future development, it is a track that is vital. In fact, it may well be the *most* vital advance during the middle sections of the game. Gear up for the Steam Engine advance as quickly as possible after it appears on your menu screen.

S

Steam Engine



Usually lost in the shuffle of other Advances, a good case can be made for developing the Steam Engine expeditiously. Like Britannia, the Ironclad will rule the waves for many years and is an effective instrument for obtaining "sea-periority" and making some occasional shore bombardment of enemy units. Moreover, the Steam Engine is required to discover the Railroad advance, one of the most important in the game. Many elements of modern mechanization trace back to the Steam Engine, so with the possible exceptions of Gunpowder (and Musketeers) or Metallurgy (and Cannons) during a military crisis, fire up the Steam Engine quickly.

Steel

I smelt a rat.

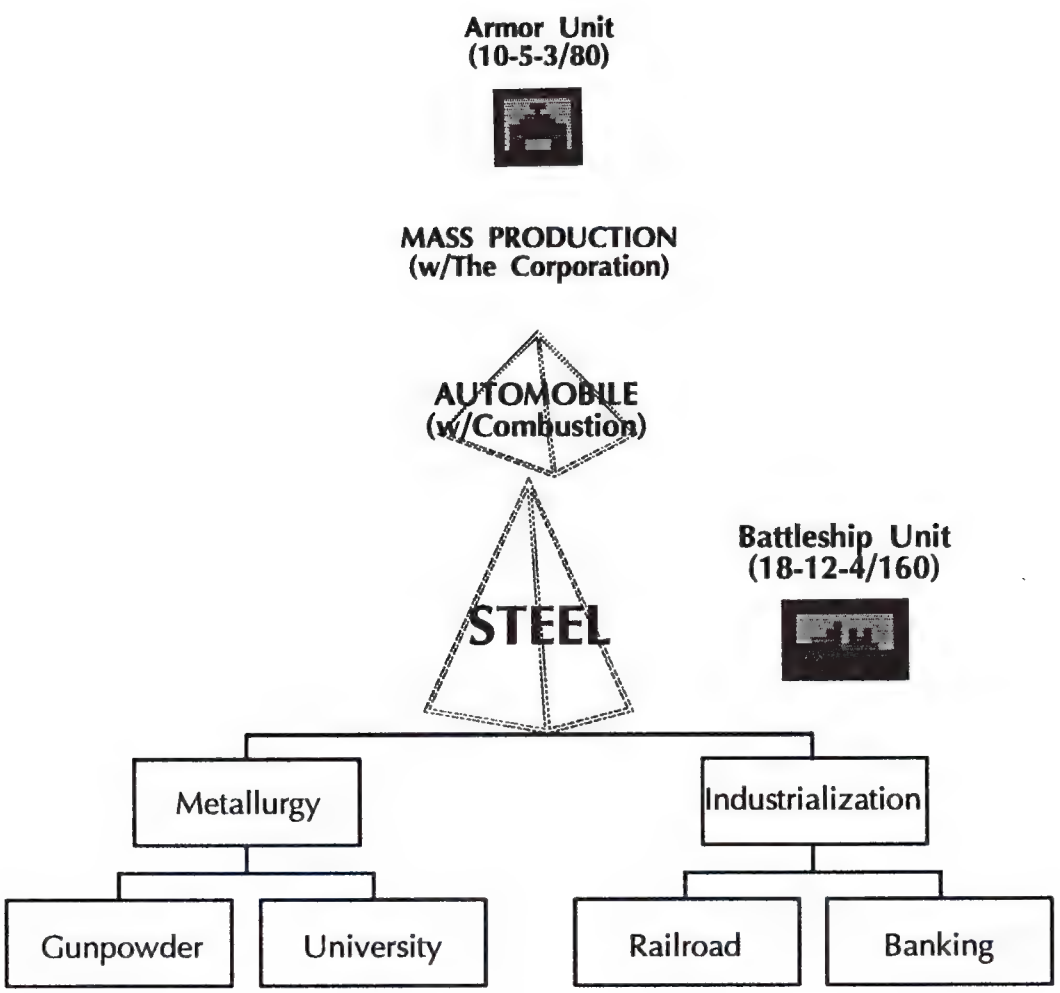
— Henry Bessemer?

Prior to the development of the Bessemer process (see below) in the middle of the 19th century, the best steel was a crucible-smelted carbonized steel from Asia. It was known as damask steel in Europe and as "watered steel" in Persia. The technique is thought to be of either Chinese or Indian origin and it depends upon being forged at low temperatures or in being resmelted in the crucible and cast in a mold.

In the middle of the 19th century, an American named William Kelly and and Englishman named Henry Bessemer independently came to the realization that placing molten pig iron in a furnace and blowing air upwards through the molten iron would have a beneficial effect. The air both purified the molten iron and kept the metal at high temperatures, even when the normally flammable elements had been consumed. Then, the molten metal could be rolled into ingots of steel, ready to be worked.

By the late 19th century, the open hearth process had become the primary method of steel manufacture. Its main advantage was that it achieved a steel which was of a superior grade. By the early 20th century, most steel mills had modified the Bessemer process to use pure oxygen instead of merely air or were using small electrical furnaces. *Sid Meier's Civilization* uses Steel technology to refer to the 19th century and the use of steel plating to make Battleship units possible.

Playing Tip: If you are at peace, it will be difficult to choose the Steel technology because it does not offer any immediate benefits for the civilization at peace. You will have to get the technology sometime, because Mass Production is required prior to getting the vital Nuclear Fission advance. Civilizations at war will love the chance to purchase Battleship units and eventually, gain Armor units.



Ah, Battleships! What joy! As if it weren't enough that Steel is a building block for the Automobile and its wonderful Armor units, while you're waiting around to discover Combustion, you can build glorious Battleships. Although expensive, Battleships have the highest attack and defense strengths in the game and roam the seas like the great Laviathans that they are. Their ability to shore bombard enemy units (particularly in port cities) makes them a crucial military unit in modern warfare and, while not fast, their ability to hit hard and survive makes them THE prime weapon of modern naval warfare. If you want Battleships, steel yourself up first.

Superconductor

Did someone call me?

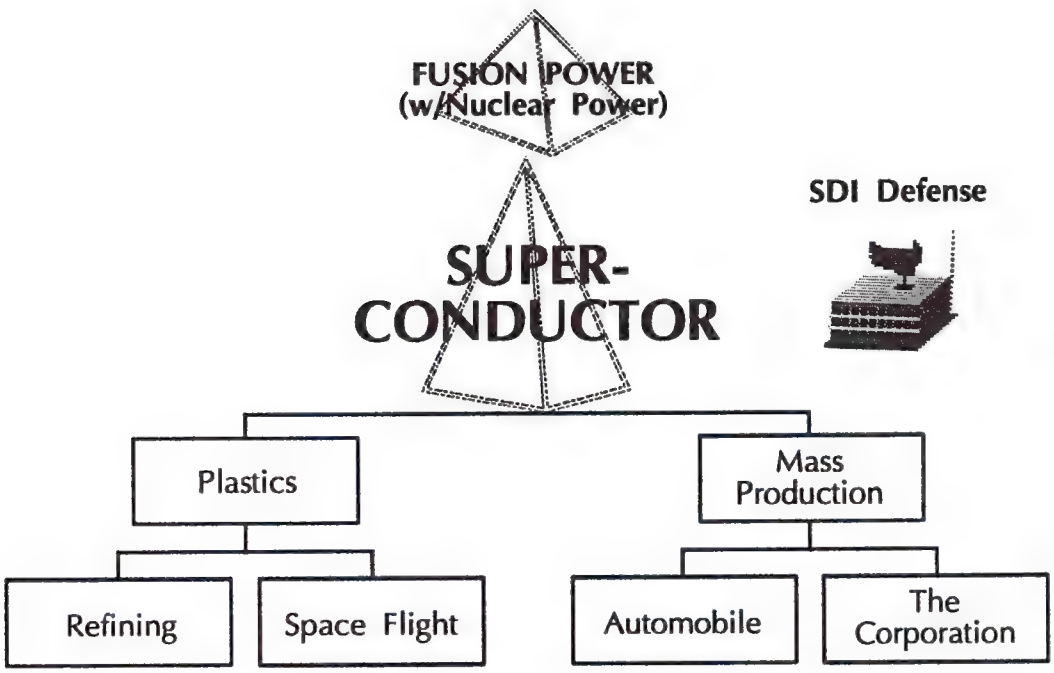
— Leonard Bernstein?

In 1911, a Dutch physicist named Heike Kamerlingh Onnes discovered that an ordinary piece of mercury wire lost all electrical resistance and possessed infinite conductivity when it was subjected to extremely low temperatures. In 1913, Kamerlingh Onnes won the Nobel Prize for his research. Since that time, it has been discovered that literally dozens of ordinary compounds and chemical elements are actually Superconductors in either their natural crystalline state or when subjected to extremely low temperatures.

Sid Meier's Civilization is not really concerned with superconductors as we know them today. Rather, the Superconductor advance presented in the game assumes that there might be a discovery of a Superconductor at normal everyday temperatures. If such a discovery were to occur, it would mean considerable savings with regard to the transfer and distribution of energy. The game assumes that such a Superconductor will be discovered prior to the development of Fusion Power and the types of sophisticated technological advances that will be required prior to the colonization of outer space.

Playing Tip: By this time, you already know that you are going to need the Superconductor technology to get to your space ark. So, what are you reading this page for? Get your wise men to *discover* a Superconductor!

S



Usually your penultimate useful discovery, the only real "emergency" that might spur you toward the Superconductor is the threat of nuclear attack. The Superconductor advance provides the ultimate counter to the nuclear threat in the form of the fairly expensive (200 shields plus 2 coins per turn) SDI Defense improvement. Building this improvement city-by-city can be a real pain, but so is losing half a city's population and getting another half-dozen or so pollution squares to clean up in the process from enemy nuclear attacks. Don't rush this one if you feel confident that nuclear attack doesn't seem likely. Conversely, expedite it if it does.

Superconductor

The Corporation

Let's get together and put on a show.

— Flo Ziegfeld?

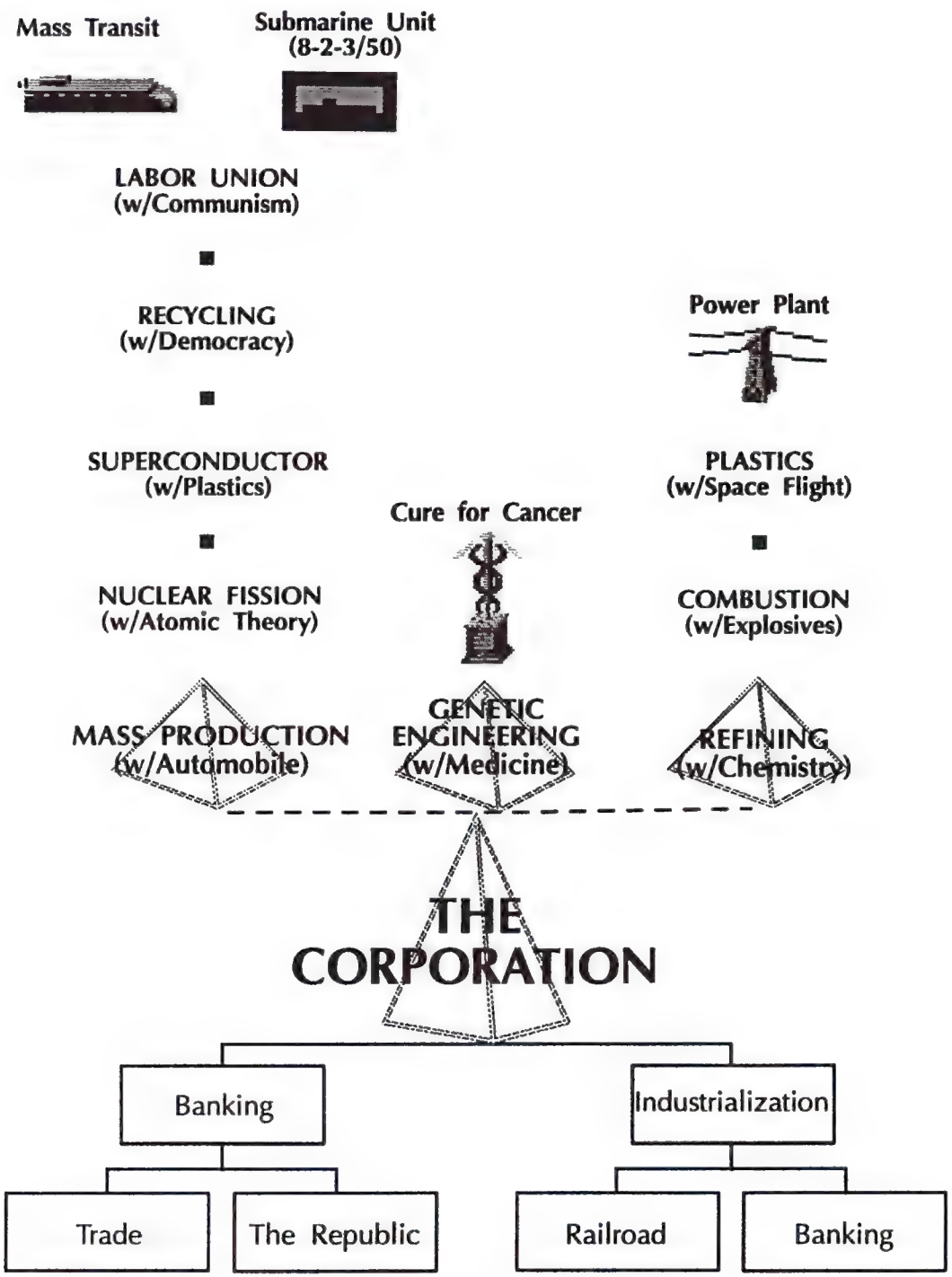
Prior to the settlement of North America, most collective agreements where investors joined together in a particular venture were partnerships. There were institutions which were *called* corporations (i.e. monasteries, universities, towns, etc.), but there was no concept of ownership being split among the participants. Rather, these institutions simply existed on behalf of the common good.

By the time of the settlement of North America, the British crown had guaranteed the right of groups made of certain privileged merchants to engage in business as "one body corporate." Indeed, much of the settlement of North America was supposed to be just such a business venture, but the colonists simply didn't buy into the expectation.

In the early portion of the 19th century, the city of New York passed a law that enabled any legitimate business person to incorporate. By the latter part of the century when the Transcontinental Railroad was being constructed, a tremendous amount of capital was required. So, the corporations involved issued massive amounts of stock. The value of the stock was sent skyrocketing when a Supreme Court case (Santa Clara County v. the Southern Pacific Railroad) was decided in the railroad's favor because a corporation is entitled to the rights of any *person.*

This decision caused many of the major corporations that are still listed on the New York Stock Exchange to incorporate and issue stock: U.S. Steel, International Harvester, U.S. Rubber and American Can, to name a few. Then, in order to service this new area of the economy, investment bankers got into the act.

Playing Tip: As you near the endgame, it is vital to get The Corporation advance in order to follow the required Mass Production and Refining tracks.



The Corporation is a modern conduit to many other Advances. It is the business equivalent of the Philosophy advance which will thrust you to the highly desired Mass Production and Refining technologies. You are urged to "incorporate" when your can safely find the time to research it and are ready to get down to some serious business.

Theory of Gravity

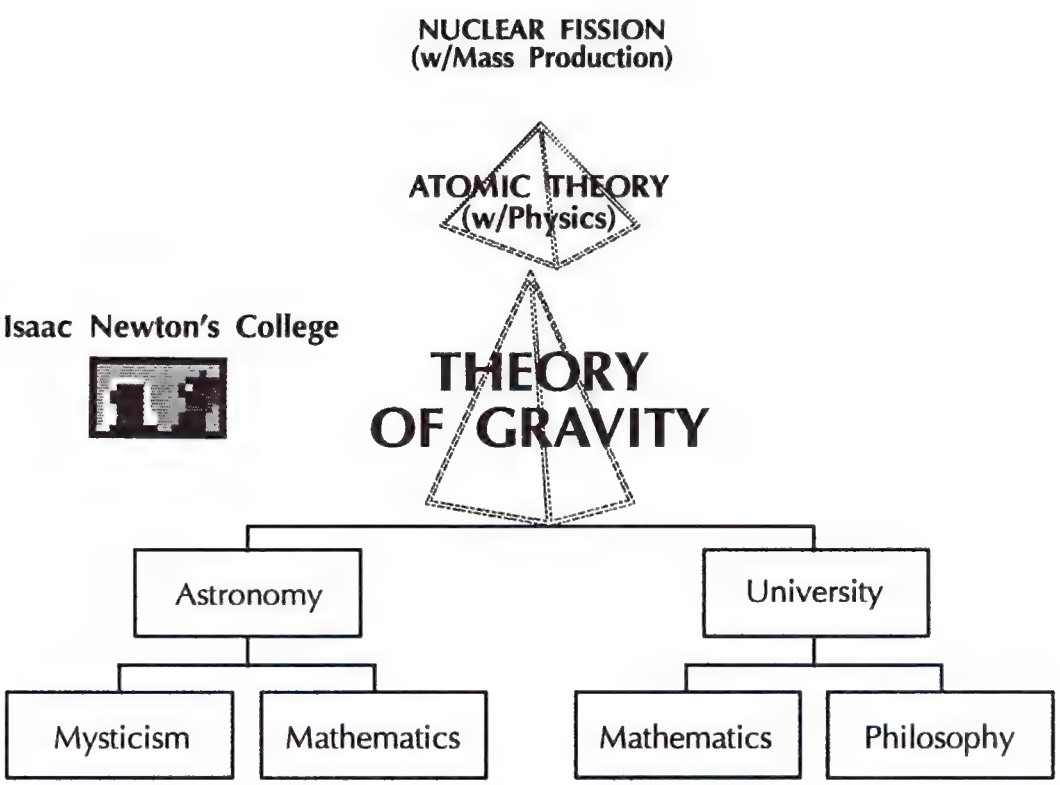
No reason. I'm just in the mood for apple dumplings.
— Isaac Newton?

Isaac Newton once described his inspiration for the theory of gravitation as the falling of an apple while he was in a mood of contemplation. Note that he did not say, as the more popular legend does, that the apple fell on his head. Rather, he merely stated that an apple fell. Apparently the falling apple caused him to think about the apple as one sphere in proportional relation to the moon.

Next, he seems to have remembered the hunch of one professor, Robert Hooke, that gravitational attraction might decrease as the square of the distance. Perhaps, he also recalled Edmund Halley's suggestion that the centripetal force toward the sun would decrease in proportion to a planet's distance from the sun. Thus, by Newton's logic, the moon should experience 1/3600 of the acceleration of the apple toward the earth.

After making such a bold mental leap, Newton decided that he had his unified theory of the universe and set out to prove it mathematically. He reconciled all of the movements of the heavenly bodies to the mathematical calculations he had suggested in his initial proposition and expounded upon them at length in his *Mathematical Principles of Natural Philosophy*. *Sid Meier's Civilization* celebrates Newton's profound insight which, as the Civilopedia observes, opened the way for Einstein's special theory of relativity and the search for a grand unified theory.

Playing Tip: If Isaac Newton's College has not been founded by the time the Theory of Gravity advance shows up on your menu, you should consider selecting the Theory of Gravity advance soon after it is available. If the Isaac Newton's College wonder is already completed by a computer-controlled civilization, you might as well wait to choose Theory of Gravity until you are ready to discover Atomic Theory.



The Theory of Gravity just isn't big news. While the Isaac Newton's College wonder is a great light bulb generator (increasing the output of both Libraries and Universities to a 67% bonus each) for a long time (until Nuclear Fission is discovered), the Theory of Gravity just doesn't do much else. Until you are ready to start splitting atoms, sit under the apple tree with someone else and split hairs instead.

Theory of Gravity

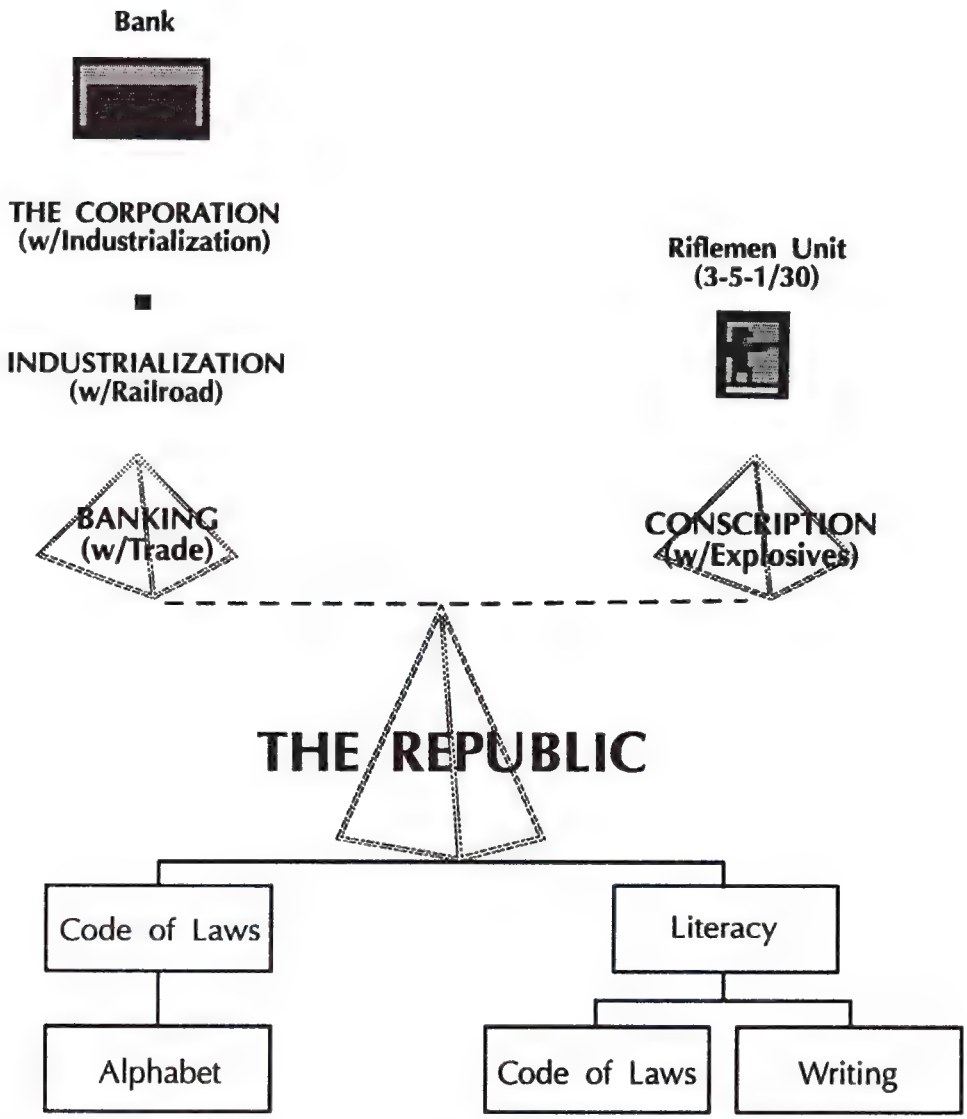
The Republic

You politicians think you've got it tough. The after-dinner circuit I worked was so tough we had to fill our mouths with rocks to train for it.

—Demosthenes?

The Republic advance enables you to establish The Republic government type. As you will read in Chapter 6, The Republic is a collection of city-states and is the first, though weakest, of the representative governments available in the game. According to the Civilopedia provided in *Sid Meier's Civilization*, the form of government is more reminiscent of the Roman Republic prior to the establishment of the empire under Julius Caesar than it is reflective of Plato's Republic. Actually, The Republic government type is based on a struggling representative government where everything is not entirely efficient and the representatives of the city-states do not entirely trust the central authority. Therefore, it offers *some* of the benefits of a representative government, in terms of increased production, and all of the deficiencies without having the full advantages of production bonuses and the lack of corruption associated with Democracy.

Playing Tip: If you happen to be at war, you will not want to change your government to The Republic. However, having The Republic *advance* can still be an advantage because it is one of the prerequisites for Conscription, which is the gateway to Riflemen units (relatively inexpensive defense). So, you may want to acquire The Republic, even if you are at war and do not plan on changing your government type immediately. If you are not at war, there is no problem with shifting government type and following the pathway to Banking, Industrialization and The Corporation. Such a path is the way to increased earning power for your civilization.



The first of the two representative governments which you'll usually discover is The Republic. You can (and should) switch to this form of government in order to establish prosperity while still maintaining some ability to wage an offensive war. Truly, you could manage the entire game without ever leaving The Republic as a form of government. Additionally, Banking is a fine advance to make, particularly with a representative government installed, as Banks increase both coin and luxury production by 50%. If you are looking to upgrade your empire, vote for The Republic (and move faster than The Senate). All in favor?

The Republic

The Wheel

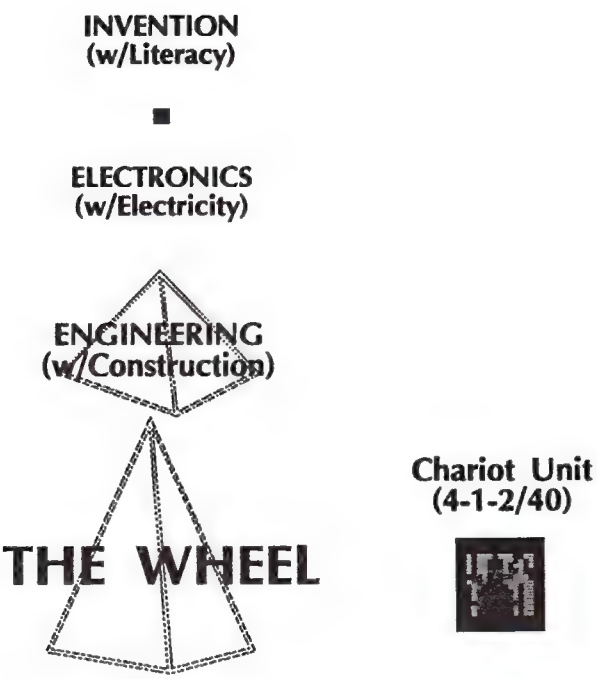
What spins around, comes around.

— Copernicus?

The wheel was being used as early as the 4th millenium B.C. as evidenced by a picture found on a clay tablet at the ancient city of Uruk. The use of wheel technology meant that beasts of burden would no longer have to pull dead weight or sledges behind them. Instead, the wheel provided for more efficient use of the animals' drayage power. In the ancient world, oxen were usually used to pull the wagons because the two-wheeled designs had a tendency for the wagons to try to tip one way or another and hence, the broad-backed oxen were more capable of holding up the load and restabilizing it without getting injured or losing the whole load on its side.

By the time of the Greeks and Romans, solid wheels were used for the heavier loads and several different spoke patterns were used on lighter wheels. Obviously, one disadvantage of the solid wheels (called *tympana* or "drums" by the Romans) was the fact that they were heavy enough to slow the vehicle down. Chariots of war used spoked wheels in order to guarantee maneuverability on the field of battle, but used more spokes than racing chariots (which tended to have fewer spokes in order to lighten the load and increase speed). The obvious disadvantage to having less spokes was the capacity for wheels breaking or getting out of round.

Playing Tip: In *Sid Meier's Civilization*, the immediate advantage of attaining The Wheel advance is the ability to build chariots of war. Unless you are at war, however, you can place a few advances ahead of The Wheel technology because most of the rest of the advances come toward the mid-game.



The Wheel

While it is arguably the single most important invention of mankind, the wheel is often overrated in Sid Meier's Civilization. Basically, you should rush off to discover it when the military need arises and Chariots are required to bring a war home to the enemy. Other than that, The Wheel won't be useful until after Construction is in place and Engineering needs to be discovered. Thus, in a world a peace, The Wheel can wait and gather moss. For war, however, there is no substitute.

Trade

I'll have none of your beeswax.

— Sumerian trader?

In primitive societies, the concept of Trade began with a realization of surplus. One tribe or settlement realized that they had a surplus of some goods which they could not use before they spoiled. So, the tribe took the surplus goods to neighboring civilizations and, according to Will Durant, initially gave those surplus goods to their neighbors in anticipation of due consideration. As Durant noted, even in the modern world many deals are consummated over a meal. Things may not have changed that much.

As neighboring tribes became aware of the surplus goods accruing to each other, an informal system of barter grew up where tribes would trade, for example, a specified amount of beeswax for an agreed upon amount of corn.

Of course, the time came when frustrated traders, used to having ready trades, ended up arriving at a gathering of other tribes and discovered that no one wanted to trade anything for his beeswax. This irksome problem was apparently solved in a variety of ways, all of which led to the eventual establishment of currency. First, common items like livestock or shells were treated as currency and a value was placed on everything to be traded. Second, gold and silver jewelry were used as stable currency. Finally, the Egyptians began to use notes of credit.

In the earliest eras, most trade seemed to be by water, whenever possible. However, there is physical evidence (business seals) in ancient Sumer of Egyptian and Indian trade that would have required overland routes.

Playing Tip: If you are expecting to win at *Sid Meier's Civilization* by building a productive, peaceful civilization, you will absolutely *need* both the Trade advance and the Caravan units that it will enable you to build. The Caravan units not only allow you to increase your cash flow, but also allow you to speed up the building of any wonder or, if you use the invoice switching method described in Chapter 10, to accelerate building any unit or improvement.

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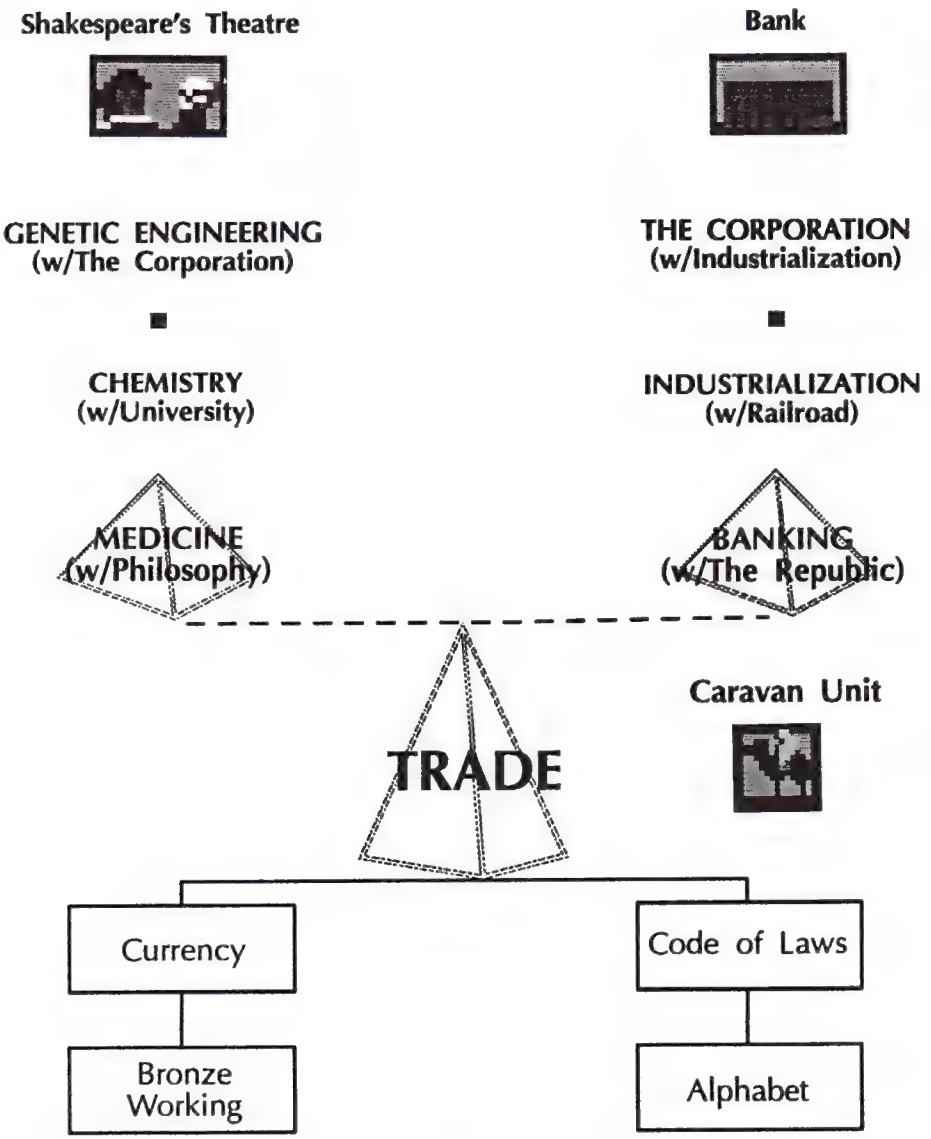


Because of the two important uses for Caravan units (namely, establishing trade routes and helping to expedite the building of wonders), Trade is an important discovery for any growth oriented civilization. Be aware that Banking is the amplifier for two of trading's main benefits (Banks increase coin and luxury item production by 50%). Since Trade is one of the foundations of Banking, that makes it doubly important. When not pursuing more basic or military Advances, acquiring Trade will move you toward the prosperity required for long term growth. Such a deal!

Trade

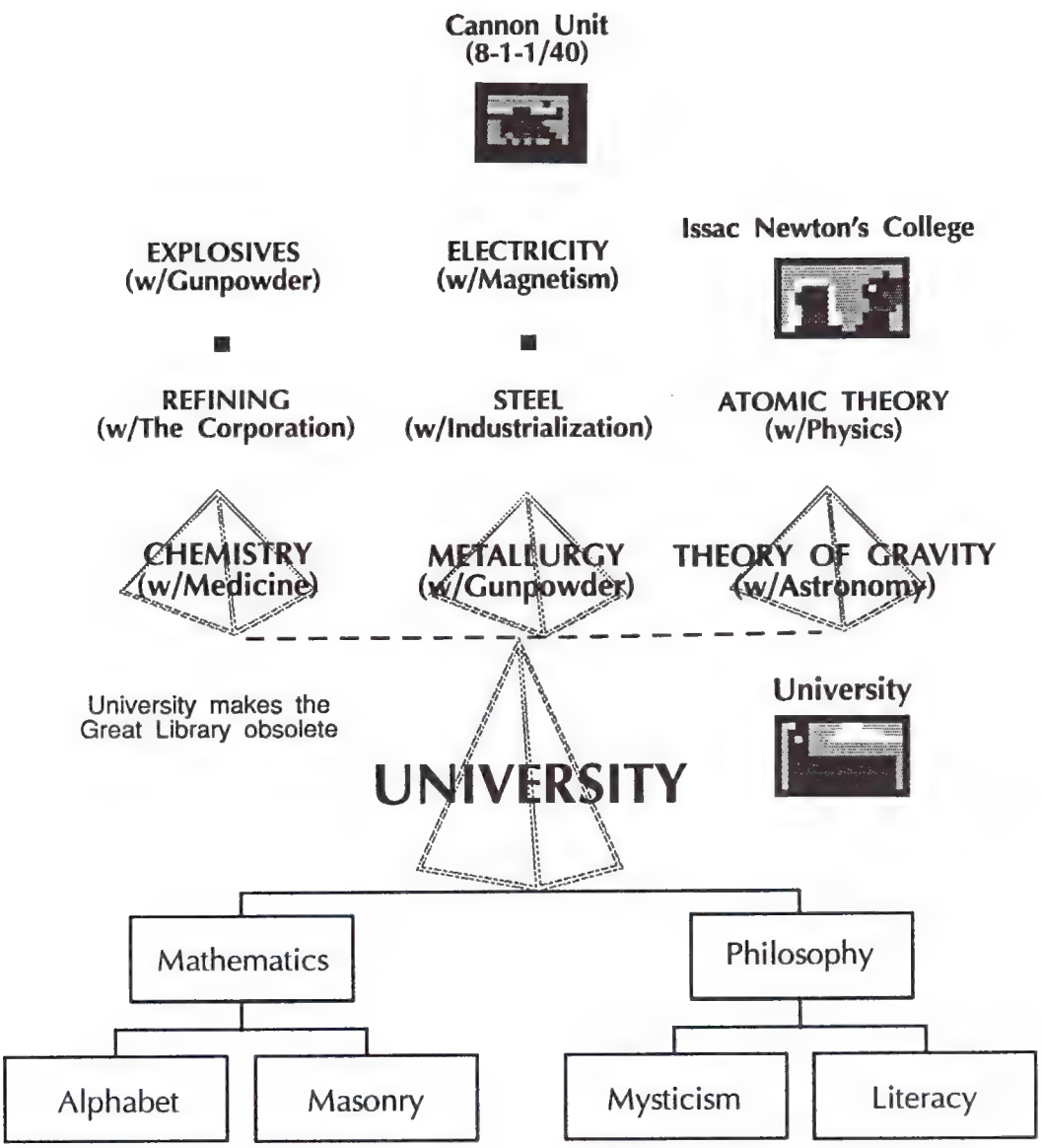
University

Here is a half-crown to give to your mother and tell her there is very serious doubt you'll ever be a scholar.

— Sir Francis Bacon?

You have already read about the history of universities and the value of the University improvement in Chapter 4. In *Sid Meier's Civilization*, the University advance makes it possible for you to build a university. In addition, reaching the University level of knowledge opens up the Chemistry, Metallurgy and Theory of Gravity paths (the first two of which are useful to civilizations at peace and the last which is primarily useful to civilizations which wish to discover and develop nuclear weaponry). Note: The University advance makes the Great Library obsolete, so do not destroy your advantage if *your* civilization has control of the Great Library of Alexandria.

Playing Tip: As suggested on the "Pyramid of Progress" chart. Be patient and wait until the mid-game to go for this advance. After all, the world waited until the medieval period before it had universities in real life.



Behold, the University! As an Advance, it closes the doors on the Great Library wonder (which is a real shame if you happen to own it) and leads to the important discoveries of Metallurgy (with its Cannons) and Chemistry. The University improvements themselves add 50% to a city's light bulb production, exactly the same as Libraries do, but at a greater cost (particularly for all of the students waiting in line to pay their tuition and register). While there is seldom an urgent need for this Advance, at some point it will become a necessity. Universities can wait a while, therefore, but not forever. It's all a matter of degree(s).

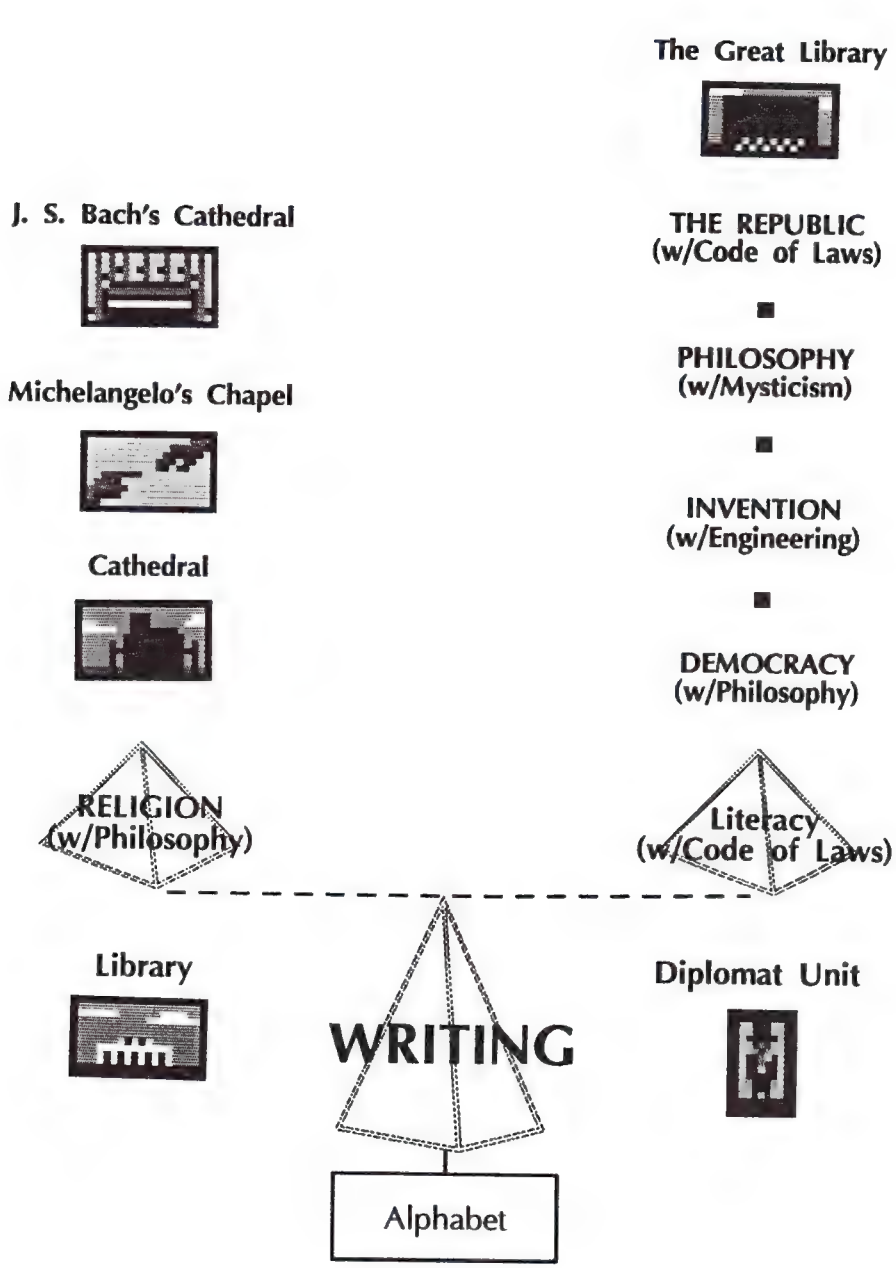
GRAPHICS NOTE: The urban rioters will take on their more modern look now that their heads are filled with "radical" new ideas from the University.

Writing

The disease of writing is both a horrible and wonderful thing.
— Russell Sipe

You have already read the discussions on Alphabet and Literacy in this chapter. Writing is the skill that combines the representations of sounds symbolized by the Alphabet with the intelligent transmission of those symbols which is required by Literacy. Writing makes possible the longevity of stored information and enables intergenerational and intercultural transformation of that information.

Playing Tip: Let's face it. You cannot be victorious at *Sid Meier's Civilization* if you do not acquire the Writing skill. Whether you are at peace or at war, you will need the Diplomat unit (intercultural transfer of knowledge?) to interface with other civilizations, keep track of their movements and accomplishments, make treaties and, occasionally, steal technology from them. In the same way, whether you are at peace or at war, you will need the Library unit (described in Chapter 4) and the acceleration of knowledge that it provides for your civilization. As if all of these factors were not enough, you cannot attain the most efficient form of government (Democracy) or the vital skill of Invention without acquiring the Writing advance. So, put Writing as a high and early priority in the game.



Writing

You must think of writing as the narrow end of the scholarly telescope. While peering through it, you'll pass through the ever wider channels of Literacy and Philosophy. Both representative governments also hinge on Literacy, and as a foundation of Religion, Writing is very important there, too. Combine all this with the Diplomats and all that they can do in war and peace, and this Advance is truly something to write home about. Although Libraries will probably not be a priority city improvements for some time, the rest that Writing has to offer is worthy of note(s) and you should shake your quill to get it.

Technology at a Glance

I could do that.

— You?

In this chapter, we offered historical notes, and observations concerning the game's treatment of various technologies and disciplines and tactical considerations for game play. You should now be aware of where to find information on every potential advance with which you will be confronted in the course of playing the game and, you even have "left wing/right wing" advice on whether to acquire each advance or not. You should be able to read the "Pyramids of Progress" and determine your route through the precarious maze of advancement in both the sciences and humanities.

Although most of the historical information which is provided is readily accessible in reference works, we hope that the placement of all these references and anecdotes will both enhance your enjoyment of the game, but will also help put some of the panorama of the flow of progress into perspective for you. Note also that much of the information provided in this chapter is cross-referenced with Chapters 3, 4, 6, 8 and 10. This is intended to help you get a better handle on the structure of the game's mechanics than you might have been able to have without such references.

The next chapter, as you may have surmised, will walk you through the governments of *Sid Meier's Civilization* and assist you in learning how to make your entire civilization as productive as you should, by now, be able to make your cities.

Chapter 6

The Government of Civilization

One of the broadening aspects of travel is seeing other governments in action and getting a first-hand perception of how different systems affect the culture, quality of life and security of the citizens in that foreign country. As a time traveller in *Sid Meier's Civilization*, you not only get to view different governmental systems and philosophies, but you also get to change back and forth in order to precipitate the desired impact on culture, quality of life and state security. A major portion of this chapter will be devoted to the examination of the types of governments available both in reality and within the game.

Of course, travellers often find themselves at odds with foreign governments, laws and customs without quite knowing what to do. In such cases, there is usually a representative of their own government available at the nearest embassy who is willing to give them a helping hand. So, the final portion of this chapter will, in essence, be your embassy. This trouble-shooting guide should serve as a resource in helping you out of various kinds of problems into which your civilization might run.

The Need for Government

Never vote for the incumbent!

— Franklin D. Roosevelt?

"A State," said Plato in Book II of *The Republic*, "arises, as I conceive, out of the needs of mankind; no one is self-sufficing, but all of us have many wants. Can any other origin of a State be imagined?" In Book I of *The Republic*, Plato had established the fact that an individual is not capable of producing *everything* that the individual would want. Thus, he underlined the division of labor in order to provide a

well-rounded mix of products. Then, he observed that there would need to be a marketplace for trade to occur. Next, he suggested that other communities which do not have as much as the original community might try to take products from the first community by force. Thus, the first community is forced to create a standing army.

With the standing army, there have to be commanders. Now, the original community is no longer totally self-supporting because it has a warrior caste that does not *produce*, so it becomes necessary to obtain goods from neighboring communities. Thus, a trading class is formed. Eventually, there are questions of injustice and there has to be a ruler or ruling class to ensure that economic and social transactions are handled justly. So, the origin of government is to be found in both humankind's desire to possess more and the inherent untrustworthiness of the individual. "For all men," as Plato observed in the same section of *The Republic*, "believe in their hearts that injustice is far more profitable to the individual than justice."

Ernest Gellner stated in *Plough, Sword and Book: The Structure of Human History*:

> Property and power are correlative notions. ... The agricultural revolution gave birth to extensive storage of both necessities and wealth, thereby turning power into an unavoidable aspect of social life.

Power is born to defend what a nascent society already *has* and grows to determine what distribution and maintenance of surplus there will be. In *Sid Meier's Civilization*, there are six different types of governmental structures and each has different effects on your civilization as a whole. These are: Despotism, Anarchy, Monarchy, Communism, The Republic and Democracy. The Government Effects chart, supplied later in this chapter, will provide a quick reference that will tie together the facts about all the potential government types found in the game.

Despotism

I'll take charge, now.
— Thomas Dewey?

Despotism is rule by absolute power. It is your initial state as a civilization in *Sid Meier's Civilization*. According to Gellner, such force can be either applied as *primary* or *secondary* power. Primary power represents a person directly coercing another by physical threat. Such power might be represented on the tribal level by the chief who can physically defeat all contenders (i.e., "might makes right"). Secondary power occurs when the wielder of power uses rules (with *implied* threats of force) to implement submission and enforce obedience.

In *Sid Meier's Civilization*, Despotism represents that phase of government in which the civilization begins under the control of a charismatic(?) leader (*you*), who probably attained his or her position by personal prowess on the battlefield, and moves toward a social hierarchy with a professional soldiery. As Plato might be paraphrased, you really do not have a ruling class until you have something to defend. The initial position of your society in *Sid Meier's Civilization* represents this flash point.

Naturally, this development of a power structure creates a minimum of two classes of citizens: the plough (those producers who actually create the surplus) and the sword (both rulers and defenders, since power has a dual purpose of maintaining order and defending the society from outside forces). With few exceptions, the sword is mightier than the plough, but that does *not* mean that the producers of a society will have the highest incentive to maximize their production.

If those of the plough portion of society feel they are being oppressed or exploited, they will not produce as much. *Sid Meier's Civilization* reflects this tension because societies under Despotism do not require you to pay for the *support of* military units until the number of citizens in the sword caste is greater than the number of citizens in the plough caste. The same is true of Diplomatic and Caravan (trade) units (which also represent part of the rising elite class of citizenry and is true under all forms of government in this game). However, any square that would normally produce three or more food, resource or trade units will have that number reduced by one to reflect this lack of incentive under Despotism.

Despotism is, fortunately, useful for the early periods of the game when you might be defending your civilization, since military costs are less than in other governmental forms, but it is best left behind as more sophisticated governments become available because the production penalties become more acute.

Anarchy

It's the "do your own thing" thing.
— George Bush?

Anarchy is the chaotic time of lawlessness which almost inevitably occurs during the early period after a revolution. It is the vacuum created by the overthrow of the leadership which must be filled by the creation of a new ruling class. In *Sid Meier's Civilization*, your particular civilization will experience Anarchy under two conditions: 1) when changing governments without the Pyramids of Giza wonder (see Chapter 8), and 2) if there is sufficient unrest in your cities under a Democracy.

Sid Meier's Civilization treats Anarchy as, essentially, disorganized Despotism. The cities continue to function according to the parameters of Despotism, *but* no taxes are collected, no maintenance is charged for city improvements and no scientific research is occurring. Obviously, you will not want your civilization to continue in Anarchy for any longer than you can help. When changing governments, the only way to avoid Anarchy is to have built the Pyramids of Giza wonder. When you have civil unrest in your cities, refer to the "Dealing with Civil Disorder" section of this chapter.

Monarchy

What do you mean I can't call myself "George I"?
— George Washington?

Monarchy can be distinguished from Despotism by the fact that it exists with a certain amount of acceptance and approval from the general populace. As noted in the discussion of the "hydraulic hypothesis" in Chapter 3 and the discussion of the Pyramids of Giza wonder in Chapter 8, monarchy often combines religious authority with civil authority in order to establish a volitional base for civil obedience. So, in a sense, citizens of a monarchy often perceive their ruler as either a god, offspring of a god, demi-god or representative of god (i.e. ruling by divine right). This strengthens the loyalty of the populace and enables the citizens to feel that they are serving their deity and their country at the same time.

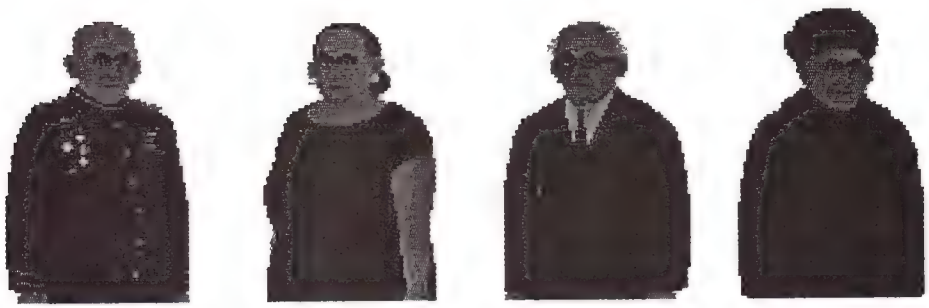
In *Sid Meier's Civilization*, Monarchy suffers no production penalties such as those created under Despotism and Anarchy. In addition, the game recognizes the truth of the "hydraulic hypothesis" by offering the increased yield when Grassland and River squares are irrigated, as well for mined Hill squares.

The game notes the expense necessary for maintaining a warrior class, however, by charging one resource per turn maintenance for all military and Settler units.

Monarchy is an efficient government for learning the lessons of production. It is one of the easier governments to manage since it offers less opportunity for civil unrest (since military units can enforce martial law in cities) and allows you to manage either a wartime or peacetime economy with little effort. More advanced governments offer different advantages for different types of economies, but Monarchy seems the best *balanced* government in the game.

Communism

What this government needs is a touch of class.
— Karl Marx?



In the true sense of the word, communism represents a classless utopia where all material possessions are held in common. As the communist movement developed in the 20th century, it came to represent a totalitarian regime which became self-perpetuating (up until 1991), rather than "provisional" as its early advocates had intended. In a very real sense, communism arose from the perception of Karl Marx and Friedrich Engels that religion served to perpetuate oppression by promising a future "pie in the sky" to the working class in order to keep them satisfied with their lot in this life.

Marx and Engels delineated the principles of a society where such injustice could not occur in their *Communist Manifesto*. In Russia, G. V. Plekhanov adopted the Marxist viewpoint and taught the necessity of a revolution, succeeded by a temporary democratic government which would aid the transition. He

was followed by V. I. Ulyanov (better know by his revolutionary code name of "Lenin"), a more famous practitioner, who emphasized class struggle and recognized the need for a temporary *capitalist* stage. What actually ensued from the revolution, of course, became the repressive totalitarian regime of Stalin before the middle of the century.

In *Sid Meier's Civilization*, Communism handles military costs exactly like Monarchy and does not face the production penalties associated with Despotism. However, because of the tight central control of personal freedom and enterprise, Communism does have a distinct effect in terms of trade. It is a "good news / bad news" situation in that corruption is at a (relatively low) fixed, *flat* level in every city. Thus, the *good* news is that a Communist government can expand territorially without increasing corruption at the furthest limits of its empire. This is often more than offset by the *bad* news, which is that *every* city will suffer from some corruption, even your capital city and the large neighboring cities which usually surround it. You will have to build courthouses in all your larger cities to help reduce corruption, but since Communism serves as a sound, advanced wartime government, it just might be worth it.

The Republic

Deep down, I think the Senate really respects me.
— Julius Caesar?

The Republic is a collection of free city-states, analogous to many of the Greek city-states in the Delphic League (the amphictyonic or cult-centered alliance of Greece's golden age). As in Plato's *The Republic*, there is a professional class made up of rulers who are, ideally, philosopher kings. One person, such

as *you* in *Sid Meier's Civilization*, may take on the primary responsibility of leadership, but all of your major decisions will have to be sanctioned or confirmed by an assembly of elite citizens corresponding to Plato's ruling class. In game terms, they are known as the oft cursed Senate.

Surprisingly enough, for all the freedom espoused in *The Republic*, Plato violated some constitutional principles which are considered vital for more modern expressions of representative governments. For example, Plato actually advocated censorship as a function of government in order to guarantee that the education (indoctrination?) of children was established on a solid footing and suggested in another portion of the book that it ought to be acceptable for rulers (but no one else in the society) to prevaricate.

In *Sid Meier's Civilization*, the presumed freedom of the citizens and the atmosphere of free enterprise is particularly good for production. Grasslands, Rivers and Hills are given the same bonuses that they accrue under Monarchy, but every square that generates at least one trade unit automatically generates *an additional* trade unit under The Republic. This increase in trade is often quite dramatic in the game, and the increase in the coins, luxuries and lightbulbs it generates is a highly welcome event.

The downside to The Republic is that martial law is abolished (i.e., each military unit ceases to suppress one unhappy citizen into contentment) and every military unit which is not in its home city makes one content citizen unhappy. Unless you use the "Representative Transformation Process" described in this chapter, you can easily develop a hefty amount of civil unrest by switching to The Republic prematurely. In addition, the Senate is overstocked with "doves" as they unilaterally accept *any* offer of peace from *any* neighboring civilization whether *you*, as leader, want that treaty or not. Even worse, they prohibit you from opening hostilities with a neighbor with which you currently have a treaty. One simply cannot start a war of aggression, nor fight to a successful conclusion, a war in which the Senate is allowed their say.

Representative Transformation Process

Once you transform your civilization from one of the more autocratic forms of government into one of the representative forms of government, you will have to deal with the fact that the opinions of the general populace carry considerably more weight. In fact, under Democracy, there is a chance of an undesired Revolution (not selected by you) if a city stays in civil disorder for more than one turn.

To avoid the problems associated with poor morale among the general population, you can safely prepare to establish a representative government by setting the Luxury Rate at 20-30% during the Revolution which is intended to pave the way for the new government. Some will complain that this will reduce scientific research and advancement, but the change to The Republic or Democracy will generate so much additional trade that you will not even miss the reduced scientific expenditures. Think of this process as priming the pump through a capital gains tax. The rich may seem to be getting richer, but so is the general economy. Arthur Laffer would certainly approve.

Finally, never forget that a transition has occurred. You can no longer get away with using military units to suppress disorder and keep citizens in line because military units now *cause* unhappiness. Representative governments in *Sid Meier's Civilization* tend to regard pacifism as a virtue and are not pleased by a visible military presence that reeks, to them, of the totalitarian repression in their past. They truly seek to beat your swords into plowshares.

Democracy

Just for that, we're going to free everybody!

— Mikhail Gorbachev?

Democracy may be defined by its etymology. The word itself comes from the collation of two Greek words: *demos*, meaning "people," and *kratos*, meaning "rule." In essence, it comes from the Greek concept of leaders ruling by the consent of the people. In practice, the western system of representative democracy has had a long evolution through the consent

granted to the divine rule of monarchs by the feudal lords (such as is provided for in the *Magna Carta*) and onward through the 19th and 20th century developments of Parliaments, General Assemblies and Congress. The beauty of the system is that it is built upon a "give and take" principle whereby the general population allows the leadership to make certain decisions for the public good in exchange for certain "constitutional" guarantees of individual and/or local rights which are to be protected by the national entity.

In *Sid Meier's Civilization*, the guarantees of freedom assure that there will be absolutely no corruption. We presume that means that Sid discounts such excesses as those of the Tammany Hall regime of the Democrats and the Teapot Dome scandal of the Republicans. Power corrupts, as Aristotle wisely observed, and it does so whether the power is based in the people or not. As one cynic observed about the American government, "Jimmy Carter campaigned by stating that he wanted a government as good as the American people themselves. Whenever we see a governmental scandal, we know we have one." Nevertheless, the game takes the high road with regard to corruption and asserts that the guarantees of a free society minimize the likelihood of corruption.

As noted in the "Representative Transformation Process" section of this chapter, two turns of Civil Disorder in a city create the possibility of an unwanted Revolution occurring. This tendency is even more exacerbated by the fact that the absence of a military unit from its home city creates *two* unhappy citizens instead of the one experienced in The Republic.

In short, Democracy provides the same advantages with regard to the economy as found in The Republic, but with *no*

corruption. It is, by far, the *best* form of government for building a peacetime economy, but the devastating morale effects of sending troops into battle cause it to be the *worst* form of government when your civilization needs to go to war. Remember, air units (Fighters, Bombers and Nuclear units) cause unhappiness in a Democracy or The Republic *even when stationed in their home cities.* Sid explains this as their need "for a constantly high state of readiness." The moral is, don't go too happy building air units under a representative form of government.

Playing Tip: A Democracy does *not* derive any benefits from keeping its palace. This is important because it means that you can sell your palace, which not only provides an extra infusion of cash, but also allows you to ensure that your space ark can *never* be captured (since it is by taking your palace that the enemy captures the space ark).

Table 6-1. Government Effects

Item Effected	Government Types					
	Despotism	Anarchy	Monarchy	Communism	The Republic	Democracy
Type	Despotic	Despotic	Totalitarian	Totalitarian	Representative	Representative
Food	-1	-1	None	None	None	None
Resources	-1	-1	None	None	None	None
Trade	-1	-1	None	None	+1	+1
Corruption (a)	Highest	High	Average	Flattened	Low	None
Mil.Support (b)	Free	Free	1 per	1 per	1 per + 1 sad face	1 per + 2 sad faces
Settler Support	1 food	1 food	2 food	2 food	2 food	2 food

Notes:

-1 = Per square if it produces three or more.

+1 = Per square if it produces any trade at all.

a) Corruption can be determined exactly by the Corruption Formula which follows.

b) Military Support represents the resource units required to maintain every military unit. "Free" means that city can support a number of units equal to its city value with no support cost. Beyond that, they are one resource each. Sad faces are created each turn when a military unit leaves the city in which it was built, or always in the case of Fighters, Bombers and Nuclear units. Note that resource costs must be paid for Settlers, but not for Caravans and Diplomats, and that none of these three unit types generates any sad faces.

Corruption Formula

Corruption = Total Trade * Dist * 3 / (10 * Govt)

Dist = Distance from your palace in squares (diagonal squares count as

approximately 1.5 squares distance). Under Communism, the distance from your palace *always* equals 10 squares (i.e., it is "flattened" and made the same for all cities). If you currently have no palace, the distance *always* equals 32 squares (the maximum).

Govt = Government modifiers: (Anarchy=8); (Despotism= 12); (Monarchy= 16); (Communism= 20); (Republic= 24); (Democracy= 0)

Corruption = Corruption / 2 (if a Courthouse or Palace is present)

What to Do When in Trouble

If you can't take the heat, blame somebody else.
— Harry Truman?

Just as every international traveller needs to know how to contact his or her country's embassy whenever there may be some trouble in a foreign land, the remainder of this chapter is designed to provide tips concerning some of the most common problems you might face in trying to manage your government in *Sid Meier's Civilization*.

Making Your City Grow Faster

But if there's a power blackout, what will people do all night?
— Thomas Edison?

Sid Meier's Civilization assumes an equilibrium between birth and mortality rates *whenever* there is sufficient food to meet the needs of the established population in a city. Unlike computer game models where living conditions (taxes, cost of living and quality of life) are factored into the residual growth factor of a city, the growth factor in the game is based solely on the ability to exceed the subsistence needs of your people. Here are some formulae which demonstrate how the calculations work.

City Growth Formula

Each point of population in a city consumes two food units per turn. Surplus food is placed in the Food Storage Box and the cities grow to the next higher number when that number times ten, plus one, units of food fill the box. For example, to grow a city from a 4 to a 5, 51 units of food would be required in the Food Storage Box.

Once a city grows, the food box is emptied and the process of

filling it begins again. A Granary (60 + $1/turn) has the effect of drawing a line across the center of the Food Storage Box and, after the city grows, the box remains half full. Granaries not only put a city halfway toward its next point of population growth, they also keep famine in check.

Naturally, an important way to increase the amount of food being produced is to place Settler units on a square in order to irrigate that square and receive a production increase commensurate with the terrain bonuses/penalties discussed in Chapter 3, which is added to the government bonuses/penalties described earlier in this chapter. Note, however, that Settler units require food for support. The amount of food required to support a settler unit varies by government type, as indicated below:

Table 6-2. Settler Food Support

Government Type	Food Support Required
Despotism	1 per turn
Anarchy	1 per turn
All others	2 per turn

Of course, in *Sid Meier's Civilization* (as in real life), the environment does not always cooperate with the civilization. Natural disasters such as drought and famine, as well as human disasters such as pirate raids, can have drastic effects on the populations of cities. In the game, Famine and Piracy both empty whatever food is in the Food Storage Box, with Famine having the additional effect of reducing the city size by 1/3 (rounded down).

Remember, the best way to create more food is to have more farmers working around a city and optimize the farmlands with irrigation and railroads (which are both very efficient). Putting the miners, fishermen and elite citizens back to work farming, and creating more arable land by converting swamps, jungles and forests to grasslands and plains, is a sure way to expand the food supply. It might even be necessary for cities located in a less fertile areas to irrigate some hills, rather than mine them.

When City Squares Overlap

I like my neighbors close, but this is ridiculous!
— Wilt Chamberlain?

As can be seen on the Terrain map located in the center of the City Display, each city can "work" (obtain resources, food and trade from) twenty of its surrounding squares (plus the square the city itself is located in). These squares are located in a two-square radius pattern extending out from from the city (excluding the diagonal squares two spaces away from the city proper). This "urban radius" pattern is something that all *Sid Meier's Civilization* players become quite familiar with.

When neighboring cities spring up, however, often their urban radii will overlap each other. When this occurs, only one city or the other will be able to exploit a given land square for its economic value. The city successfully exploiting such a square will show the normal production output in its terrain map, while the city that was "cut out" will show the square encapsulated by the dreaded "red box." The deprived city will not be able to move laborers into this red-boxed square until the other city relinquishes its control by ceasing to work the contested square.

In dealing with these rural "red zones," if you own the other city that is working the land, you can open up its City Display and move the workers off the overlapping square and onto another one. (If you don't own the city, consider conquering it.) Then you can go back to the first city and put their workers on the previously red square. Of course, that square then becomes off limits (i.e., red) to the other city, but that is simply the way it goes. You will have to judge which city will most benefit from exploiting each and every overlapping terrain square in order to optimize its potential growth and economic value.

The point is that you must be careful not to build cities too close to each other if you want fewer (but larger) cities. While this arrangement is easier to defend militarily, building more cities which have *slightly* overlapping land radii (no more than four or five squares) is highly useful for exploiting every possible arable land square available (since not every

continent fits neatly into the patterns of a standard city production radius). In terms of developing maximum economic potential, "binary dwarf cities" can be developed faster than a single huge one, and between them they can exploit more total land, even though parts of their radii overlap. In other words, when things are getting crowded, go ahead and build cities to work the nooks and crannies of unexploited land. This will enhance noticeably both your population and your Civilization Score.

For all you engineers, what follows is a table that shows the number of squares that will overlap between two cities. The top row indicates the number of squares apart the two cities are horizontally (left and right), while the left column shows the number of squares they are apart vertically (up and down). By cross-indexing these two values, the result will be the number of overlapping squares shared by the two cities. You may want to reference this when selecting your next city site, in light of nearby existing cities.

Table 6-3. Urban Radii Overlap

Distance Vertically	Distance Horizontally 5	4	3	2	1
0	0	3	6	11	16
1	0	2	6	10	14
2	0	1	4	7	10
3	0	0	2	4	6
4	0	0	0	1	2
5	0	0	0	0	0

How Enemy Units Affect City Productivity

All right, men, burn the crops, loot the village and pillage the land. And for God's sake, get it right this time!

— Attila the Hun?

When enemy soldiers are within a city's economic radius, the computer will move any workers off the land squares they occupy and onto another space automatically (would *you* want to stick around there?). While these spaces will not show

red boxes on the terrain map of the City Display (and players *can* keep placing workers back on them), every turn the computer will move them off again before calculating the city's production. Therefore, *give it up*. The only way to get that land back into production is to purge it of other civilization's military units, period. (Of course, you know, this means war!)

Fishing for Fun and Profit

...but teach them to fish and they will have food for a lifetime.
— Otto Von Bismarck? (founder of the modern welfare state)

Here is the truth about working (fishing?) Ocean squares. Working oceans is *better* for your overall economy than making elite citizens. That is because an ocean creates an additional food unit for city growth (and thus another citizen down the road), plus three trade arrows. *Three* trade arrows, that is what you need to keep in mind; whereas an elite citizen only produces *two* of whatever its specialty is. Both the conversions from trade arrows and infusions from elite citizens (be they coins, luxury items or lightbulbs) are multiplied by the same amounts for city improvements (marketplaces, banks, libraries and universities), so the bottom line is that you'll get more with three of something (from working the oceans) than with two of something (from creating an elite citizen).

Increasing Trade Income

Why walk a mile when you can ride a camel?
— Sign over Ali ben Attaturk's used Camelot?

Trade income, naturally, comes from trade arrows, so the initial (and obvious) thing to do is work squares around the city which produce more trade arrows. Building roads, railroads and switching to a representative form of government (either The Republic or Democracy) is a good way to increase trade arrows generated, but these require considerable time and other sacrifices. Exploiting the gems, gold mines and oceans near a city will generate plenty of arrows (instantly, too). However, these land exploitation ploys are usually detrimental to long-term city growth and suffer

greatly from this serious drawback. Caravans, however, and their associate trade routes, are an ideal long-term solution.

For thousands of years before the invention of rail transportation, land conveyances used by traders changed very little. Whether merchants used the sedan chairs and wheelbarrows of ancient China, the pack-oxen and elephants of India, the camel trains of Arabia, the files of native bearers in Africa or the two-wheeled carts and four-wheeled wagons drawn by horses or oxen in Europe, transportation changed very little through most of the pre-industrial civilization.

The same can almost be said for seagoing vessels prior to the age of sail. The junks of the Orient, the Polynesian canoes, the Arabic boats of the Red Sea and Indian Ocean, as well as the vessels of the "Age of Sail" represent only incremental advances over many centuries.

Yet, caravan routes and shipping lanes were the lifelines of the ancient world. They are a key to wealth in *Sid Meier's Civilization*, as well. It costs 50 production units to form and *no* funds to maintain a Caravan unit. Caravans which arrive at a city can add their shield cost to the construction of a wonder you might be building inside it, (speeding up its construction) or may establish a trade route there. Such routes generate an immediate cash payment for their establishment, plus a continuing number of trade arrows generated per turn, as listed on the bottom of the City Information window. These trade route arrows are added directly to the line of arrows in the City Resources window.

Note: The computer will keep the three best trade routes, if a city should happen to establish more than three during the game.

Trade Route Formulae

The following are the formulae used in determining the value of trade routes.

Bonus Money Received for Establishing the Route:

$$Bonus = (Dist + 10) * (TA + TB) / 24$$

Dist = Distance between cities in squares (diagonal squares count as approximately 1.5 squares distance)
TA = Trade arrows in City A
TB = Trade arrows in City B
Bonus = Bonus * .50 (if cities are on the same continent)
Bonus = Bonus * .50 (if both cities are from the same civilization)
Bonus = Bonus * .66 (if you have developed the Railroad)
Bonus = Bonus * .66 (if you have developed Flight)

Ongoing Trade Arrows Generated:

$$Trade = (TA + TB + 4) / 8$$

Trade = Additional arrows generated each turn by the new route
TA = Trade arrows in City A
TB = Trade arrows in City B
Trade Arrows in City = Trade Arrows generated by the city, *excluding* arrows generated from trade routes
Trade = Trade / 2 (if both cities are from the same civilization)

Keep in mind that, in the long run, the distance between the two cities doesn't really matter. The ongoing trade arrows generated is the main reason to establish a trade route, so you should concentrate on finding the largest cities from other civilizations and not worrying about their distance away (as long as they are at least ten squares away, the minimum for establishing a trade route) or whether they are on a different continent or not. In other words, don't worry about maximizing the bonus income for establishing a trade route. Instead, concentrate on the maximizing the long term benefits of the ongoing trade arrows established.

What to Do About Pollution

How can you trust air you can't even see?
— Anonymous Los Angeles citizen?

Pollution is a nasty business that, fortunately, you will not

confront until the latter stages of the game (at which time it must be confronted more and more frequently). The effect of pollution is to halve the total of all production in a square, rounded up. For example, a square producing 3 food, 1 resource and 2 trade, if polluted, would produce 2 food, 1 resource and 1 trade.

Pollution Formulae

Each city has a "tolerance" for 20 Smokestack Points per turn. Each point generated beyond that becomes a percentage chance per turn of creating a pollution square near the city.

$$SP = IP + PP$$

$$IP = RP$$

$$PP = CP * PM$$

SP = Smokestack Points
IP = Industrial Pollution
PP = Population Pollution
RP = Resource Points (shields) generated by the city
CP =City Population Points
PM = Pollution Multiplier
Divide IP by 2 if city contains a Hydro or Nuclear Plant; OR
Divide IP by 3 if city contains a Recycling Center
Pollution Multipliers = .25 with Industrialization; OR .50 with Automobile; OR .75 with Mass Production; OR 1 with Plastics; OR 0 with Mass Transit

What these formulae indicate are the two contributing factors to pollution, resource (i.e., industrial) output and human waste. Industrial pollution can be halved with a Hydro or Nuclear Plant in the city, or reduced by 2/3 with a Recycling Center. Note that these reduction modifiers apply even if that city has no Factory or Manufacturing Center in it; i.e., even if the Hydro or Nuclear Plant is not generating its +50% shields (they can only do that if a city contains a Factory or Manufacturing Plant). Population pollution just grows and grows as a headache until a city builds a Mass Transit improvement, at which time there miraculously ceases to be any population pollution generated in that city at all. (What can we say, Sid's an optimist...)

For example, a city with 12 Population Points currently generates 16 shields from the land. The city has a Factory

(adding 8 more shields) and a Nuclear Plant (adding another 8 shields), bringing the total shields produced to 32 (16 + 8 + 8). There is no Recycling Center in the city, but the Nuclear Plant will halve the industrial pollution, bringing it down to a total of 16 Smokestack Points.

Technologically, this civilization has advanced as far as Mass Production (and not yet made it to Plastics), but this particular city has not yet built a Mass Transit improvement. Thus, the population pollution is 12 (for the city size) times 3/4 (for Mass Production), or 9 Smokestack Points.

The Smokestack Points generated, then, are 16 (for the industrial pollution) plus 9 (for the population pollution), for a total of 25. Since each city can "tolerate" 20 Smokestack Points per turn, when subtracted from the 25 generated, 5 are left. Thus, 5 smokestack icons (pollution indicators) will appear in the City Information window and that city will have a 5% chance of one of its adjoining land squares becoming polluted each turn.

Note that pollution is pollution is pollution. Whether from industrial waste, a nuclear meltdown or a nuclear attack, every pollution square that you see anywhere on the map counts the same toward global warming, penalizes you 10 Civilization Points and requires a Settler unit four turns to clean up. After a nuclear attack or meltdown, each of the eight squares adjacent to the occurrence has a 2/3 chance of becoming polluted.

What to Do About Global Warming

Global warming is directly related to pollution. When enough *visible* pollution appears, the planet overheats and global warming kicks in. Only the polluted squares that you can see count toward global warming (i.e., what you can't see can't hurt you). Computer players will follow your "lead" in cleaning up their own (invisible) pollution squares. If you are aggressively cleaning up each pollution square, so will the computer players. Likewise, if you let pollution sit for a while before dealing with it, so will the computer players.

Global Warming Formula

Eight pollution squares are enough to trigger the first bout of global warming, but the planet requires this condition to exist for a while before temperatures rise enough for tangible results to occur (i.e., the creation of many new Desert spaces). After the first time a planet is scourged by global warming, each additional bout requires two more polluted squares than the previous one (i.e., the second episode of global warming would require 10 visible polluted squares over a period of time, the third 12 squares and so on).

The Global Warming Indicator (located next to the lightbulb in the Status Window of the Map Display), will appear and glow in brightness in proportion to the danger of global warming. Note that there is a lag time between the appearance of the polluted square and the change in the sun color.

Table 6-4. Global Warming Indicator

Sun Icon Color	# Visible Polluted Squares
Dark Red	0-1
Light Red	2-3
Yellow	4-5
White	6+

Dealing with Civil Disorder

Let's hang half the citizens as an example to the others.

— Jean Paul Marat?

As a city grows, its population is made up three kinds of citizens: happy, content and unhappy. Elite citizens are drawn from the ranks of the content or, should there be no content people left in the city, from among the happy citizens. When there are more unhappy people than happy people in a city, the player has a problem with the city going into Civil Disorder (i.e., the city generates no taxes, no lightbulbs and no production; maintenance costs, however, are still charged!). Note that contrary to the what the rules state, taxes and corruption have *no bearing whatsoever* on happiness (except, of course, for the fact that the bigger the bite they take, the less

there will be available for making the luxury items that would make people happy).

Since Civil Disorder can be inconvenient for *any* city and a particular disaster for a Democracy, here is a quick guide as to how the problems of unhappiness got started and how to keep the peasants from revolting.

Causes of Unhappiness

Too Many Citizens: After the first few citizens in a city are "born," every other new citizen arrives unhappy. The number of initially content citizens is determined by the difficulty level selected (Chieftain = 6; Warlord = 5; Prince = 4; King = 3; and Emperor = 2).

Military Expeditions: Under the representative governments, every military unit (except for Settlers, Diplomats and Caravans) not located in its home city (or all Air units, including Nuclear units, regardless of their basing) will generate sad faces in its home city. Under The Republic, each military unit creates one sad face. Under Democracy, each creates two sad faces. The brutal part of it is that sad faces are added in *after* adjustments for city improvements (like Temples and Cathedrals), so these won't directly help you when marching off to war. Fortunately, any wonders that affect happiness are calculated *after* the addition of sad faces, thus further enhancing their value.

Cures for Unhappiness

There are four cures for unhappiness of citizenry. The first method is to increase the luxury rate. This will increase diamond production throughout every city in a player's civilization. Every two diamonds will make one content citizen happy, thus creating a counterweight to offset one unhappy citizen when determining if a city will go into civil unrest. Adjustments to the luxury rate can be made and undone at will, offering you a high degree of flexibility for the instant easing of Civil Disorder.

The downside to increasing the luxury rate is the loss of tax revenues and scientific research, but a luxury rate becomes a necessary evil, particularly when operating under a representative government.

The second method is by the creation of Entertainers (the little Elvis icons, or "Elvii"). This method takes workers off the land, causing the city to produce fewer resources, but is an expedient way to hold things together until the third method, discussed below, can be implemented. Note that beginning with a city's twenty-first citizen, all new members of the community cease to be born unhappy and are instead born as Elvii.

The third method to "reduce" citizen unhappiness is through marshal law. Under all governments except The Republic and Democracy, each military unit in a city "suppresses" one unhappy person, forcing them into contentment. The trouble, of course, is that *except* under Despotism, military units require one resource per turn in maintenance. Furthermore, they often die defending their cities or are required to abandon them and march off to war. City garrisons, therefore, are *not* the optimal solution.

The final, and best overall, method is to build something that will appease the masses. There are five city improvements (see Chapter 4) and six wonders (see Chapter 8) which will keep a lid on unrest. Buy them, use them, love them.

In a city Information window, there is a "Happy Button" (no, it's not smiling). When pressed, it reveals the Population Happiness chart. It is important to note that the effects of military units are calculated in the happiness formula *after* that of city improvements, but before that of wonders. Therefore, the only thing that truly helps representative governments when their troops leave a city or when Fighter, Bomber or Nuclear units are built is the effect of wonders (particularly Women's Suffrage).

In addition to the preventative factor with regard to Civil Disorder, note that happy citizens improve your overall score, as well. Each happy citizen icon adds *two* points and each content and elite citizen adds *one* point to your civilization

score. Also, any time you can get 50% or more of the citizenry of a city into the "happy" camp (happy campers?) without having *any* citizens in the "angry" camp, the program generates a "We Love the King" or "We Love the President" day. If a city under Despotism achieves this status, the food and resource penalties are removed for as long as the conditions for "We Love the King" day last. If a city under Monarchy or Communism achieves this celebration, they get the same trade bonuses that they would achieve under Democracy for the celebration's duration. When a city under The Republic or Democracy achieves these conditions, they increase by one Population Point per turn for as long as there is sufficient food to feed them and the "We Love the President" conditions are met.

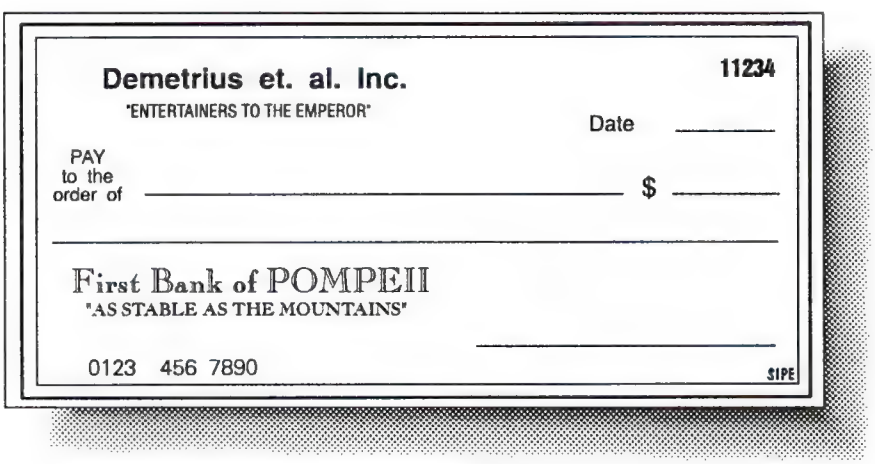
Note: A city must have, at least, three Population Points before being eligible for one of these celebrations.

What to Do When You Need Money

When in doubt, ask Dad for a loan.

— Edsel Ford?

Coins are generated from trade arrows, based on your tax rate (which can be easily adjusted by using the plus sign key). At the very least, you should have a high enough tax rate to cover the maintenance costs of all your city improvements (hit the F5 key and the Trade Advisor will present that information). An income surplus is preferable, but the cost in scientific research and luxuries must be weighed. Note that despite what the rules might suggest, taxation has no direct effect on



citizens' happiness. The only effect is the indirect loss of potential luxury items caused by high demand for coins and lightbulbs.

On this page is a "chart of accounts" for income and expenses in *Sid Meier's Civilization*. It should give players a mental picture of their cash flow opportunities.

Income and Expenses for Civilizations

Income

Taxes (based on Tax Rate and Tax Collectors)

Minor Tribes ($50 in Metal Deposits)

Sale of City Improvements ($1 per shield value)

Other Civilizations:
- Gifts (voluntarily given by enemies)
- Tribute (demanded of enemies and paid)
- Plunder[a] (for captured enemy cities)

Expenses

City Improvement Maintenance (paid per turn)

Rushed Production[b] ($2-4 per shield purchased)

Bribing Enemy Units (varies. See Ch.7 and 9)

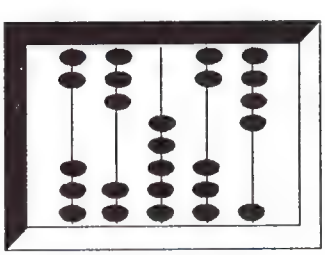
Inciting Enemy Cities to Revolt (varies. See Ch. 7)

Other Civilizations:
- Tribute (demanded by enemy and paid)
- Plunder (from cities captured by the enemy)

(a) Plunder Formula: The amount of money awarded as plunder is the same proportion of your treasury as the population of the city captured was in proportion to your total population.

For example, a civilization with a treasury of 100 coins loses a city with a 4 population. Prior to losing the city, that civilization had a total of 12 Population Points. The lost city represents 1/3 of the civilization's total population, so 1/3 of the treasury, rounded down (33 coins) is lost to due to plunder.

(b) $2 per shield purchased; $4 per shield purchased if none already exist in Production Box



Revenue Enhancements: While there are many ways to enhance trade (see the Trade table in this chapter), there are only three sure ways to enhance coins generated. The first and most expedient way is to increase the tax rate. The second method is by the creation of Tax Collectors (see Chapter 4). Third, you can build a Marketplace and/or Bank (see Chapter 4).

Tight-Fisted Frugality: Here are some suggestions for keeping the coffers full:

- Sell all Barracks immediately prior to the completion of your research into Gunpowder and Combustion. Each of these advances eliminates them all anyway, so you might as well cash in on them prior to their obsolescence.
- Similarly, you should sell a city's Factory if it has been made obsolete by the addition of a Manufacturing Plant in that city.
- Likewise, if you are building a new palace, you should sell the old palace prior to the completion of the new one. Of course, corruption will be rife for a turn, but if your government is a Democracy or you really need the money...
- Switching from Power Plants and Hydro Power to Nuclear Power (particularly after the Fusion Power makes Nuclear Plants 100% safe) will save $2/turn in maintenance. You may safely sell all of your power sources on the same continent as your Hoover Dam wonder (just don't lose the "dam" thing).
- If the people in a city are happy enough, sell the local Colosseum. The $4/turn to maintain them is outrageous (until the very end of the game, see Chapter 9).
- If the military threat against your civilization is reduced, it might be possible to sell off some City Walls and Barracks. Consider this carefully, however.

A Final Deposit

Bear in mind, when spending the treasury down to the last coin, that there might be a nasty surprise in store. While a

civilization as a whole may have a revenue surplus for the turn, the computer pays maintenance costs in a city before collecting revenue from it. All cities are checked one at a time, in the order in which they are listed by the advisors. For example, the City Advisor (the **F1** key) lists all the cities in the order that they are checked at the beginning of every turn. Keep enough in the treasury, therefore, so that nothing has to be "sold" in the first city checked by the computer to cover short-term expenses.

Finally, never go over 32,000 coins in the treasury. That is the limit of the game's capacity to hold money in one player's account (like having 32,000+ coins in the treasury is a common occurrence!).

Accelerating Technological Advance

I just wish I could come up with something original.
— Leonardo da Vinci?

Scientific Research (aka "lightbulbs") are generated from trade arrows. Whatever is not consumed by your civilization's tax and luxury rates becomes the scientific research rate. Scientific research is used solely to obtain civilization advances and can be gauged by checking with both your Trade Advisor (the **F5** key) and Science Advisor (**F6** key). The former indicates how many turns will be required to discover the next item, while the latter shows an array of lightbulbs which, when it reaches the far-right end of the box, denotes that an advance has been made. Another indicator is the brightness of the single lightbulb in the Status Window of the Map Display. The more it fills with brightness, the closer you are to your next discovery. The Civilization Advance Formula shows you how advances are determined.

Civilization Advance Formula

LB = PA * Difficulty Modifier

LB = The number of lightbulbs required to achieve the next civilization advance
PA = The number of previous advances achieved (*including* those acquired from other civilizations and scrolls of wisdom)
Difficulty Modifiers: Chieftain=6; Warlord=8; Prince=10; King=12; Emperor=14
All of these modifiers are doubled after the year 0, and a minimum 10 exists for

the first discovery, dropping to 9, 8 (and stopping there if playing at the Warlord level), 7 and 6 if playing at the Chieftain level for subsequent discoveries.

Action Plans to Increase Light Bulbs

While there are many ways to enhance trade (see the earlier section on trade in this chapter), there are only three sure ways to enhance light bulbs generated. The first method is to increase the scientific research rate. This will increase light bulb production throughout every city in your civilization. The opportunity costs here are lost tax revenue and luxuries generated. The saying about knowledge being power holds particularly true in *Sid Meier's Civilization* and you are advised to set the tax and luxury rates to a bare minimum whenever you wish to achieve more rapid technological advances. Falling too far behind in the technology race can lead to serious problems, but with a concentrated effort (either an R&D effort or a war effort), it *is* possible to catch up.

The second method is by the creation of Scientists (the little Einstein icons). This method takes workers off the land, causing the city to produce fewer resources, but is an expedient way to rush the discovery of a needed advance (or series of advances). Note that, beginning with a city's twenty-first citizen (or when all of its nearby space is already being worked), all new members of the community cease to be born unhappy and are instead born as Entertainers. Take the opportunity to convert these "super babies" into Einsteins whenever necessary.

Finally, the third method is to build the appropriate city improvements (Chapter 4) and wonders (Chapter 8). Note, however, that scientific research *can* be a wasteful matter. If you are generating 100 light bulbs per turn, yet are only one lightbulb away from the next discovery, the other 99 light-bulbs are wasted and lost forever. Thus, you may want to try to optimize your scientific research by asking your Trade Advisor (the F5 key) for counsel. Look for the number of turns required for the next discovery, and then play with the tax and luxury rates a bit to see if there are any differences at different rates.

For example, if your tax rate of 40% means that it will take six

turns to discover the next advance, but a 50% tax rate will only take seven turns, it might be worth waiting one more crummy turn in order to pocket the difference in cash.

Summary

This chapter was designed to help you understand the basics of the government types in *Sid Meier's Civilization* and to offer some practical guidance in governing your civilization. You should have learned which governments are most advantageous in peace and war, as well as the advantages and disadvantages of each government type. In addition, you should have learned how to increase production of light bulbs, happy citizens, food and population.

Chapter 7

Battlefield Monuments

While it is the nature of human civilizations to honor their dead (see Ceremonial Burial in Ch. 5), honoring those who have fallen in battle is likely to become the stuff of legends and history books.Thus, if you want to leave an impression on the worlds of *Sid Meier's Civilization*, it is not enough to sit idly by and be remembered as a "Great Builder." No, *Sid Meier's Civilization* simulates the predator-filled real world in which we live, so you must be a "Great Captain" as well. Other leaders in the game respect your military might above all else.

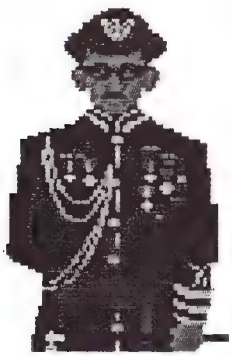
Here is a historical case in point. As World War II was drawing to a close, with Germany defeated and Japan crumbling, the Allied leaders sat down at the Potsdam conference to determine the fate of, among other things, the conquered and ravished nations of Europe. After Joseph Stalin made it clear that a Soviet sphere of influence would be established in Eastern Europe (meaning that following "free" elections, friendly communist governments would be established), a problem was pointed out to the Russian leader by one of his advisors. Knowing that the Catholic church had deep roots in Eastern Europe, Stalin was informed that the Pope would not approve of Stalin's plans there. To which Uncle Joe replied, "The Pope? How many divisions does he have?"

The Wrong Staff

All I've accomplished, I owe to my advisors.

— Julius Caesar?

Now, a novice's first reaction to this chapter might be that he doesn't really need it. After all, there is a built-in military advisor in the game's structure. This advisor, to put it bluntly, is pretty useless. As a "Secretary of Defense" advocating the



need for military advances, he's fine. When it comes down to the difficult decisions of war or peace, how large an army to maintain and how to win battles, you will receive no help at all. This fact is particularly poignant when parleying with another leader. The other leader will be surrounded by his or her advisors. These advisors are explained in the "Even More Additional IBM Features Supplement" in the game box. The more there are, the larger the enemy's civilization. Their dress code indicates the type of government the enemy leader possesses. In contrast, your decisions are always made alone. Only development of diplomatic intuition and a knowledge of the enemy rulers' personalities will help in a parley.

When to Fight

The key to victory is knowing when to fight.
— George B. McClellan?

The computer's civilization advisors offer their general principles early:

> *GENERAL PRINCIPLES: (1) Defend your cities with at least one (preferably two) good defensive units. Don't expand beyond your ability to defend yourself; barbarians and hostile armies may appear without warning.*

> *GENERAL PRINCIPLES: (2) Make peace with your stronger neighbors. Crush and conquer your weaker neighbors.*

To this end, you should remember to defend cities quickly. Many a new city has been overrun while its first unit awaited completion. Early on, particularly, if you enjoy a military advantage (such as legions or catapults) over the enemy, it is advantageous to press it. Crush them and conquer them "for fun and profit." No matter how benevolent a neighbor you might be, the enemy benefactor civilizations always seem to launch a sneak attack at some point as repayment (usually after having just been extravagantly bribed, too, the dirty rats). Learn now, therefore, that the only good rival is a dead rival.

Questions of War and Peace

Of course, you know, this means war!
— Mahatma Ghandi?

Wars are relatively small affairs in the early game, and can often be managed quickly and decisively. Later on, however, eradicating another established civilization could take many, many turns. To make the "war or peace" decisions during the later game, you must appraise the situation on the board. Ask the following questions:

Does my own civilization still have room for peaceful expansion?

If not, conquered cities count just as much as a city which you nurtured from its first settler unit. One can save a lot of time and trouble by conquering an empire, rather than building it. Population growth and control of wonders of the world are the vital elements of your civilization score. Try to score double coups by conquering cities which possess wonders of the world!

Can the empire be expanded peacefully, or is this neighbor aggressive and must be dealt with?

If an aggressive or expansionistic personality is on your border, remember: "The best time to kick someone is when they're down." Better still, never let them get on their feet in the first place. The computer players, however, will often try to fight one player at a time. Thus, if one attacks, say, the Mongols (because they are hot and heavy in a war with Greece), they are likely to give the Greeks money or technology in order to cut a peace deal so that they can concentrate on the new threat. A wise leader will use a little diplomacy and get other civilizations to do his/her fighting through military proposals (one of the options during the settlement of terms for a peace treaty).

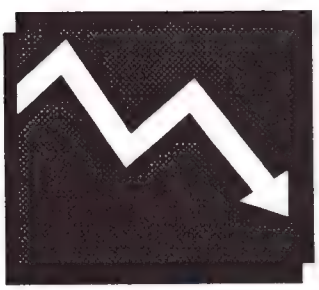
Who's better prepared for war?

While you should always be able to judge your own situation, an embassy established with the neighbor in question provides the intelligence necessary to appraise their

preparedness for war. Remember, wars are fought with two things: Military Units and money. Having plenty of these two assets equals preparedness for war. Generally, you can "feel" who's best prepared for war while parleying with other leaders. If they adopt a haughty attitude and appear to be itching for a fight (their terms will be harsh and war will be imminent if they are slighted), then rest assured that they are usually dealing from a position of strength. Even so, it is still possible to collect tribute from your neighbors without invoking a war. See the end of this chapter on diplomacy for details.

Can I shift to a war economy without a major disruption?

Certain city improvements must be built of necessity. Aqueducts for 10-point cities are a priority. Temples, cathedrals and colosseums to relieve occasional occurrences of unrest can also be urgent. The waste of shields in building three-fourths of a wonder and then, needing to suddenly shift over to something else in order to deal with an emergency can lead to frustration (e.g. having to build an emergency unit to defend a city under attack). If your society is not in a position to suffer the abandonment of internal development, it is not time to go to war. You are faced with the choice of paying the tribute or foregoing the civilization advance. "Forgive and remember," however, should be your motto. For surely, the computer player will be back after the 16 turns of respite granted by a "bartered peace" once it knows you can be bullied (that 16 turns can be shorter due to sneak attacks, so be wary). In fact, Sid Meier has designed the artificial opponents to keep coming back to the same location once they have decided that there is something of value at that point. So, Para Bellum (i.e. Prepare for War) and, if you are too weak or too strong, be prepared for a sneak attack, even if the extorted price of peace was paid.



Is my government appropriate for war?

It should be obvious to even the most casual player that the best peacetime governments (the elective governments of Democracy and The Republic) are the worst wartime

governments due to the inevitable dissension of urban dwellers when the boys go marching off to war. Now, Women's Suffrage definitely helps keep discontent at a lower level (by reducing the number of sad faces by one), but many a democratic or republican leader (not to be confused with political parties, of course) without that wonder will often be pressed to wage an offensive war against an invader. In such a case, you must give consideration to reverting to the more principled totalitarian governments of Monarchy or Communism. For those who are appalled at such pragmatic politics, try to think of this as imposing martial law during a national emergency rather than reverting to a totalitarian regime. Another tip for democratic and republican leaders is to save a ton of money and build hordes of diplomats while functioning under the elective forms of government. Then, use these "statesmen" for wars fought under totalitarian regimes.

Is there a technological disparity between our civilizations?

To find the answer to this question, you must look to see what technology level units the enemy civilization has moving around the board. Better still, if there is an embassy established, check the intelligence and look at the list of their most recent technological discoveries at the bottom. If the enemy's technology is about even with your own, wars will have a higher probability of being protracted wastes of resources.

If, however, there is a significant disparity of technological levels, war becomes a much more tempting prospect. If you are ahead in the technology race, it is advisable to use the advantage to completely crush the hostile civilization. Exploit superior technology to the fullest and make it pay on the battlefield. If, however, you are behind in the technology race, it can be sound (albeit highly risky) advice, indeed, to "Pearl Harbor" a technologically superior neighbor and try to capture (even if only for one turn) enemy cities. With the fall of each city, a technology is stolen from them, putting you at the double advantage of chipping down a leader, and climbing back into a position of dominance.

What Is Worth Fighting For?

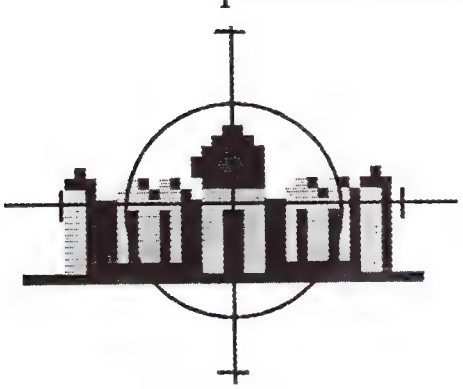
Sometimes a man has to take a stand.

— Benedict Arnold?

Certain things in the game are worth fighting for. As mentioned above, if you are falling behind in the technology race, it becomes an obligation to wage war against more advanced civilizations. Besides capturing cities, you can send in waves of Diplomats to steal much needed technologies. Like the Spy unit in *Stratego*, the Diplomat unit is highly vulnerable and highly valuable. Its ability to gather information about an enemy civilization (by establishing an embassy), city (particularly in order to find the enemy's palace, although this is often located in the civilization's first city such as Washington, London, Rome, etc.), plus its other warlike functions of inciting, bribing and stealing give it a use which makes it extraordinarily useful during a war. See the end of this chapter for some guidelines on bribery, theft, sabotage and diplomacy.

Most importantly, since the game is scored largely on the size of your population, cities are truly worth fighting for. All wars will hinge upon the conquest of cities and, as the world becomes a more crowded place and no more new cities are likely to be planted, established cities must be conquered in order to expand.

Conquering cities is good. Conquering cities with wonders of the world in them is better. If conquered, the wonder produces its benefit for the new owner, including all of the points inherent for owning it. On the down side, if a city with a wonder is destroyed in war, the wonder is lost forever. You should do a bit of target selection by aiming for key wonders by checking for their locations on the Wonders of the World menu (the F7 key).



Finally, the location of the enemy's palace should be a paramount military target. When destroyed, corruption will be rife in the enemy's empire and it will be ripe for the picking. Magnifying the importance of

the palace is the endgame space race. The only way to scuttle an opponent's space program is to capture his or her capitol. At that point, not only does their palace need to be rebuilt, so does their entire space ark.

Who *Are* These People?

Know your enemy.

— Priam, the last King of Troy?

The great leaders of history and builders of civilization are well known to all. In the Leaders table below their quantitative effect on game play in *Sid Meier's Civilization* is outlined.

Table 7-1. Leaders

Leader	Civilization	Color	Capitol	Threat	Aggression	Development	Militarism
Abe Lincoln	Americans	L.Blue	Washington	1	Friendly	Normal	Civilized
Mao Tse Tung	Chinese	L. Blue	Peking	2	Normal	Normal	Civilized
Alexander	Greeks	Magenta	Athens	5	Normal	Expansionistic	Militaristic
Elizabeth I	English	Magenta	London	4	Normal	Expansionistic	Normal
Caesar	Romans	White	Rome	3	Normal	Expansionistic	Civilized
Stalin	Russians	White	Moscow	5	Aggressive	Normal	Militaristic
Frederick	Germans	D. Blue	Berlin	2	Aggressive	Perfectionist	Civilized
Napoleon	French	D. Blue	Paris	4	Aggressive	Expansionistic	Civilized
Genghis Khan	Mongols	Grey	Samarkand	6	Aggressive	Expansionistic	Militaristic
M. Gandhi	Indians	Grey	Delhi	1	Friendly	Perfectionist	Normal
Hammurabi	Babylonians	Green	Babylon	0	Friendly	Perfectionist	Civilized
Shaka	Zulus	Green	Zimbabwe	4	Aggressive	Normal	Normal
Montezuma	Aztecs	Yellow	Tenochtitlan	1	Normal	Perfectionist	Civilized
Raamses	Egyptians	Yellow	Thebes	2	Normal	Normal	Civilized

The "Threat" rating is a number from 0 (the least) to 6 (the greatest) based on adding together the leader's ratings for aggression, development and militarism. Zero points are added if a leader is rated friendly, perfectionist or civilized; one point for each leader rating of normal; and two points for each leader rating of aggressive, expansionistic and militaristic.

Civilizations are grouped in pairs by color. If one civilization of a given color is in the game, the other certainly is not. This is important to know when a civilization is destroyed as, somewhere in the world, the other civilization of the same color as the destroyed one may be about to arise.

A good way to find out which players are "out there" is to offer a Military Proposition to another leader during a parley. It doesn't matter if you can afford it (as you must confirm your decision once the price is revealed), just a peek at the list

of which other players are in the game makes it well worth asking.

Note that after a while, you may wish to opt for some more variety in your opponents. Leader attributes can be scrambled by hitting the **ALT-R** key at any time during play. Each time the **ALT-R** key is hit, leader attributes become randomized. This may be done repeatedly throughout the game. A quick check with your Intelligence Advisor (hitting the **F3** key) will reveal what these new characteristics are. This is only available where you have an established embassy. Note, that the computer players suffer no "confusion" when their leader's attributes change. They merely proceed from their present situation with their new outlook on life.

Living to Fight Another Day

I hate to see evening sun go down.
— Joshua against the army of Gibeon?

Dead rivals, it should be noted, have a way of coming back. While watching a replay of a game of *Sid Meier's Civilization* at its conclusion, it is easily noticed that as an enemy color is eliminated, it usually finds some out of the way area to come back in again as another player. Here is the dirt on this phenomenon.

When a civilization is eliminated, its evil identical twin "cousin" will appear, if it can find a suitable site that is not in immediate proximity to an existing city. "Near" can be best defined visually by watching a game replay and observing the land areas which become shaded with the birth or conquest of each city. (Cities control the area of land around them to about five squares out.) This not only shows the size of your empire in square miles (as denoted under the World menu, Demographics subheading, under the category of Land Area), but also draws the lines which preclude civilization rebirths and barbarian native uprisings in those areas.

After the year 0, civilizations will not start up on a settled continent (i.e., one that has at least one city on it). After 1750, no new civilizations appear in the game at all. Interestingly, this rebirth is done by its own logic, even on the "historical"

Earth map. Thus, if you want to be left alone and choose the Aztecs, after reading about the fall of the Indians, it is wise to check around North and South America to see if the Mongols have just appeared there!

Finally, new civilizations are not "born stupid." Each technology the player currently possesses has a 50% chance of being a starting technology for the new player. They'll still be behind in the technology race, but not as badly as if they had to, literally, reinvent The Wheel.

Global Conquest

Think of this as a little elbow room.

— Adolf Hitler?

Sid Meier's Civilization is not only a "discover the world" game, it is also a "conquer the world" game. While not a wargame, per se, the military and conquest elements of *Sid Meier's Civilization* can create tremendous rewards. When determining your final Civilization Score, for example, the biggest prize is the 1,000 point bonus for conquering the world (i.e., wiping out all of the other civilizations in the game). That 1,000 points, however, is not written in stone.

Instead, you will earn 1,000 points if you conquer the world on the A.D. 2000 game turn; minus 2 points per turn after that, and plus 2 points per turn before that. Additionally, 100 points are deducted for each civilization less than the full complement of seven that are selected to play in the game.

General Principles of War

It's easy if you know what you're doing.

— George A. Custer?

Here are some general principles of warfare to keep in mind:

1 **Objective**. Every military operation must be directed toward a decisive, obtainable objective. Make (and stick to) a plan to obtain it.

2 **Offensive**. Only offensive action achieves decisive, favorable results. Even armies on the strategic defensive

must make proper use of local counterattacks to turn the tide and seize the strategic offensive.

3 **Simplicity**. Simple weapons, simple tactics, simple maneuvers, etc., are less likely to go awry. In war, as in art, the simplest things work best.

4 **Unity of Command**. It is better to have one bad general than two good ones who argue. The military must move with a single mind.

5 **Mass**. Having the maximum available combat power at the point of decision. Often referred to as "getting there firstest with the mostest."

6 **Economy of Force**. Keeping the minimum essential forces employed at points other than that of decision (i.e., not keeping overly large garrisons or launching multi-front campaigns).

7 **Maneuver**. Maneuver must be used to alter the relative combat power of military forces to your advantage. An opponent always has certain expectations of what the enemy will do. Disappoint (and unbalance) that opponent with an unexpected maneuver.

8 **Surprise**. Surprise may decisively shift the balance of combat power in favor of the commander who achieves it. Often, however, the side attempting to achieve surprise underestimates the enemy and is surprised by how prepared they become!

9 **Security**. Security is required to prevent yourself from being surprised and is essential to the application of the other principles of war.

Sound military advice, as offered in the preceding principles of war, is always useful. From a practical standpoint in playing *Sid Meier's Civilization*, however, simplicity, unity of command, and surprise offer little help in the game. With one player in complete command, plans can be as convoluted as you can devise. Furthermore, the computer is programmed for other civilizations to be ready for war at all times in an almost paranoid fashion. The element of surprise, therefore, is one

which can rarely be achieved since computer players so seldom drop their guard. Consequently, you must exploit the other principles of war to your full advantage.

Objective

To begin with, you must have a clear military objective for each civilization waging war against you. If you are at war with multiple civilizations, perhaps it is time to cut a deal with one and concentrate on the others. Can a war of annihilation against a civilization be won, or is a "holding" campaign necessary to allow for time to build up your military? Often, objectives are limited to seizing a city or two, then cutting a peace deal and rebuilding. Once a civilization is back on its feet, it often begins another limited war to seize another city or two, followed by another respite. The computer players often do this. Emulate them. It is a sound policy to go for limited military objectives when a war of annihilation can be ruinous to your own growth. A common military objective is to capture the enemy's capitol (which, in the case of *Sid Meier's Civilization*, is where an enemy's palace is). This is a very sound objective in the game, for losing your palace will cause you tremendous economic losses due to corruption, thus virtually assuring an easy demise. Furthermore, during the last stages of the game, capturing a capitol eliminates that player's space program, even if it was one turn away from landing on Alpha Centauri!

Offensive

To win wars, you must take the offensive. If you only sit back in your cities and await enemy attacks, the countryside will be pillaged and, eventually, the attackers will get lucky and get into the city. Know this: the computer normally plays much better on offense rather than defense. Learn to wage wars of aggression, and the computer players will be hard pressed to coordinate their defenses. Even when defending, you must know when to counterattack to unbalance an enemy offensive. The purpose of a counterattack is to allow you an opportunity to seize the initiative and take the offensive. You must create opportunities and be prepared to exploit them. Napoleon said, "What is luck? The ability to exploit accidents."

Mass

To win a military campaign, it is important for you to concentrate the maximum number of forces at the decisive place and time. This is called mass. If a key city is the focal point of a campaign (and it often is in *Sid Meier's Civilization*), grab every available unit for the campaign and march them there. When the shooting stops, only one side is left alive in *Sid Meier's Civilization*. The player with the most units at the battlefield is often the one left holding it. To maximize the mass of forces you bring to bear at a single point, it is important to conduct "one front" wars whenever possible. A player who needs to split his forces between multiple active war zones will be hard pressed to win in any single area. Stay concentrated, and maximize your chances to win!

Economy of Force

Naturally, to achieve mass, every spare unit must be concentrated at the decisive point of battle. Therefore, at every other point, economy of force is required. Cities to the rear should not be over garrisoned. Huge forces should not be scattered about exploring the world. Use the minimum forces necessary at noncritical points, so that the greatest mass can be achieved at the desired time and place.

Maneuver

Maneuver is often difficult to achieve in *Sid Meier's Civilization*, but it can be done. Strategically, this usually involves amphibious operations behind enemy lines. Often, a well-placed group of units floating behind enemy lines can wreak havoc, especially when there is a diplomat on board and money in the bank. Buying a city in the enemy's rear will be a great distraction to a computer player. Maneuvering on a tactical basis has more to do with slipping past enemy cities and units and devastating his farms, mines, railroads and (ultimately) roads. Faster units are perfect for slipping through to conduct this type of "scorched Earth" campaign, although each pillage order consumes a unit's entire remaining movement allowance. Breaking vital rail and road lines can

make an enemy particularly vulnerable to a subsequent, large scale invasion.

Security

Where most players make their fatal mistake is in the area of security. Often, you will leave cities with but a single Garrison unit, no City Walls, and no military units being built there (economizing by paring the military down to the bare bones). Worse yet, players will usually neglect their military road network. These are the roads which link your cities together, so that if one is attacked, the others can rush reinforcements to it in time to save it. Avoid these mistakes by biting the bullet on the "opportunity costs" paid in expansion and development. All the expansion and development in the world won't help when the Mongols, Greeks, Romans, Zulus or Russians come knocking at the door. You must always have the defense of the empire in mind first and foremost. (See Unity of Command earlier).

How Combat *Really* Works

No, Mr. President, the enemy is that way!
— Douglas MacArthur?

A quick explanation of the combat routine in order. Combat occurs when one of your units "bumps" into a unit of another civilization. The computer determines a winner based on the formula below, and destroys the loser.

In terms of movement, combat consumes one movement point from the attacking unit. If the unit has less than one movement point remaining (due to using some road movement that turn), a window pops up asking if you want the unit to attack at a reduced strength (note that computer players will occasionally attack at 2/3 strength but never at 1/3 strength, instead opting to wait for a full strength attack on the next turn). Units will not occupy a defeated enemy's square.

The combat formula should be thought of as pulling a ping-pong ball out of a fishbowl full of them, as is done in lotto and bingo games. The attacking unit throws a number of ping-pong balls (marked with an "A") into the fishbowl equal

to its attack strength. The defender, likewise, throws in a number (marked with a "D") equal to its defense strength. The computer mixes up the balls and pulls one out. If it is marked with an "A," the attacker wins and the defending unit(s) are destroyed. If it is marked with a "D," the defender wins and the attacking unit is destroyed. A quick example might be a unit with an attack strength of six attacking a unit with a defense strength of two, there would be a total of eight ping-pong balls in the bowl for the computer to draw from.

Specifically, here are the combat formulae:

Attacker's Strength

Attacker's Strength (i.e., AS) = Unit's Attack Factor (i.e., AF)

AS = AF * 1.5 (if veteran)
AS = AF * Road MPs / 3 (if less than one Movement Point)

In plain English, the attacking unit's strength is increased by 50% if it is a veteran unit, and this strength is reduced if the unit attacks with less than one movement point remaining. If the attacking unit's strength is fractional, both the attacker and defender's strength are multiplied by the same number so that no fractions balls are added to the fishbowl. For example, a veteran Legion unit would have a strength of 4.5. Since IBM processors truncate numbers, the fraction would normally be lost. Instead, the computer will multiply both the attacker and defender's final strengths by two, so that the veteran Legion would have 9 "whole" balls in the fishbowl, and the defender twice as many as well.

Note that Barbarian unit attack strengths are reduced at the lower difficulty levels of the game (see Chapter 2 for details).

Defender's Strength

Defender's Strength (i.e., DS) = Unit's Defense Factor (i.e., DF)

DS = DF * 1.5 (if veteran)
DS = DF * Terrain Defense Bonus (See Table 7-2.)
DS = DF * at most, one of the following:
  DF = DF * 1.5 (if Fortified using the F key)
  DF = DF * 2 (if in a Fortress square)
  DF = DF * 3 (if behind City Walls, unless attacked by Artillery or Bombers, or if the defending unit is an Air unit).

Put simply, the defending unit's strength is first modified by its veteran status, then the result is modified for the terrain in the defender's square. That number is then increased if the defender enjoys any kind of fortification. Note that if a defending land unit behind City Walls is attacked by Artillery or Bombers, it will default to receive the benefits of being fortified (from using the F key).

Combat Examples

Example 1: A regular Phalanx unit is fortified in a city on a river and attacked by a veteran Legion unit.

Attacker's strength = 3 (Legion) * 1.5 (veteran), or 4.5

Defender's strength = 2 (Phalanx) * 1.5 (River) * 1.5 (Fortified), or 4.5

Both sides would be multiplied by two to eliminate fractions, and each would therefore have 9 ping-pong balls in the fishbowl.

Example 2: A veteran Knight on a Hill square is ambushed by a veteran Chariot unit.

Attacker's strength = 4 (Chariot) * 1.5 (veteran), or 6

Defender's strength = 2 (Knight) * 1.5 (veteran) * 2 (Hills), or 6

Both sides would have 6 ping-pong balls in the fishbowl.

Example 3: A fortified, veteran Mechanized Infantry unit is in a city behind City Walls on top of a Mountain square (the toughest defense possible):

Defender's strength = 6 (Mech. Inf.) * 1.5 (veteran) * 3 (Mountain) * 3 (City Walls), or 81

If attacked by a veteran Armor unit:

Attacker's strength = 10 (Armor) * 1.5 (veteran), or 15

If bombarded by a veteran Battleship:

Attacker's strength = 18 (Battleship) * 1.5 (veteran), or 27

If attacked by a veteran Artillery unit (which ignores City Walls):

Attacker's strength = 12 (Artillery) * 1.5 (veteran), or 18

Defender's strength = 6 (Mech. Inf.) * 1.5 (veteran) * 3 (Mountain), or 27

Example 4: A veteran Battleship is defending in a city behind City Walls.

Defense Strength = 12 (Battleship) * 1.5 (veteran) * 3 (City Walls), or 54

If bombarded by a veteran Bomber (which also ignores City Walls):

Attack Strength = 12 (Bomber) * 1.5, or 18

Defense Strength = 12 (Battleship) * 1.5, or 18

Example 5: A regular Fighter attacks a regular Bomber unit.

Attack Strength = 4 (Fighter)

Defense Strength = 1 (Bomber)

If both units were veterans, the ratio would remain the same. If the Fighter was a veteran and the Bomber not:

Attack Strength = 4 (Fighter) * 1.5 (veteran), or 6

Defense Strength = 1 (Bomber)

If the Bomber were a veteran and the Fighter was not:

Attack Strength = 4 (Fighter)

Defense Strength = 1 (Bomber) * 1.5 (veteran), or 1.5

The Effect of Terrain on Combat

What follows is a close-up analysis of how terrain affects the combat equation by modifying the defender's strength. Also included are notes of military consequence concerning terrain effects. Keep in mind that the best defensive terrain (Hills and Mountains) seldom makes good city sites, but building a city *next to* these terrain types will offer an aggressor a good position to attack the city from! Therefore, keep combat in mind when selecting city sites.

Table 7-2. Terrain Effects

Terrain Types	MPs	Bonus	Notes
Arctic/Seal	2		
Desert/Oasis	1		
Forest/Game	2	50%	
Grassland	1		
Hills/Coal	2	100%	
Jungle/Gems	2	50%	
Mountains/Gold	3	200%	
Ocean/Fish	1		Naval only.
Plains/Horses	1		
River	1	+50%	
Swamp/Oil	2	+50%	
Tundra/Game	1		
Road	1/3	n/a	Can be Pillaged.
Railroad	0	n/a	Can be Pillaged.
Fortified	n/a	+50%	Lost when unit is moved.
Fortress	n/a	x2 (a)	Can never be destroyed.
City Walls	n/a	x3 (a)	Bombers & Artillery ignore.

MPs = the number of Movement Points it costs to enter that type of terrain
Bonus = the multiplier in the Combat Formulae.
a) Units defend one at a time

Military Unit Tables

The three tables which follow give a close-up analysis of each combat unit in the game, divided into three groups by epoch.

The "Made Obsolete by" column indicates the advent of which new unit precludes the further construction of the unit in question.

Table 7-3. Ancient Military Units

Unit (Adv. Required)	Values	Cost	Made Obsolete by	Notes
Militia (at start)	1/1/1	10	Musketeers	Often not worth their maintenance cost.
Phalanx (Bronze Working)	1/2/1	20	Musketeers	Best defensive unit until Musketeers are developed.
Legion (Iron Working)	3/1/1	20	Riflemen	Good offense. Cheap.
Cavalry (Horseback Riding)	2/1/1	20	Riflemen	Good speed. Cheap.
Chariot (The Wheel)	4/1/2	40	Knights	Excellent all around offensive unit. Vulnerable when attacked.
Catapult (Mathematics)	6/1/1	40	Cannon	Perfect at attacking from or against important fixed positions (like cities). Vulnerable to attack -particularly from faster units.
Trireme (Map Making)	1/0/3	40	Sail	Carries 2 units. These should always attack other Triremes since they have a 0 defense strength. If they don't end their turn adjacent to land there is a 50% chance of being sunk.

Table 7-4. Medieval Military Units — 19th Century

Unit (Adv. Required)	Value	Cost	Made obsolete by	Notes
Knight (Chivalry)	4/2/2	40	Armor	The best all around unit until modern times due to its adequate attack, defense and high speed.
Musketeers (Gunpowder)	2/3/1	30	Riflemen	The best defensive unit until modern times and a good value. Replace city Garrisons with Musketeers ASAP. Barracks disappear at this time and must be rebuilt with a new maintenance cost of 1 coin per turn.
Cannon (Metallurgy)	8/1/1	40	Artillery	Used in the same manner as the Catapult in all ways, and at the same cost. Required for rooting out fortified Musketeers.
Sail (Navigation)	1/1/3	40	Frigate	Carries 3 units. While fragile in combat, Sail units open up the map to discovery and permit wide strategic maneuvers.
Frigate (Magnetism)	2/2/3	40	Transport	Carries 4 units. Superior to Sail units in all respects and at the same cost.
Ironclad (Steam Engine)	4/4/4	60	Cruiser	The first "sea-periority" ship with enough "oomph" to perform occasional shore bombardment against low defense strength land units. Useful for raiding commerce around enemy continents and protecting your own sea-lanes. Expensive.

Table 7-5. Modern Times Military Units — Part I

Unit (Adv. Required)	Ratings	Cost	Notes
Riflemen (Conscription)	3/5/1	30	Excellent defensive unit and very cheap.
Armor (Automobile)	10/5/3	80	Best all around land unit with excellent mobility, but not cheap. Two fortified Riflemen will often stop an attacking Armor unit, making battles more cost effective for the defender.
Mech. Infantry (Labor Union)	6/6/3	50	Highly mobile and the best defensive unit in the game. Their role is limited since few mobile defense operations occur in *Sid Meier's Civilization*. Mech. Inf. usually either replace Riflemen to slightly improve a city's defense or fortify adjacent to enemy cities to form "siegeworks".
Artillery (Robotics)	12/2/2	60	Used in the same manner as the Cannon. Artillery is more mobile, thus getting twice as many shots in a close battle. Required for rooting out fortified units, Artillery ignores enemy City Walls when attacking (a considerable advantage).
Transport (Industrialization)	0/3/4	50	Carries 8 units. With twice the carrying capacity, plus better speed and defense than a Frigate, the 10 extra shield cost is insignificant. When full, Transports should be protected at all costs.
Submarine (Mass Production)	8/2/3	50	Possessing a two-space sea visibility range, Submarines can only be spotted by ships which are adjacent. Their offensive strength is their only other asset, and that is best used against Transports and other Submarines. Submarines are cheap, but easily slaughtered by more expensive ships. Use them with stealth in enemy rear areas and along transcontinental sea-lanes.
Cruiser (Combustion)	6/6/6	80	Possessing a two-space sea visibility range, Cruisers make great explorers due to their high speed. They also provide excellent Transport escorts because their speed allows them to zig-zag around in search of enemy Submarines and destroy them. Barracks disappear at this time and must be rebuilt with a new maintenance cost of two coins per turn.

Table 7-6. Modern Times Mililary Units — Part II

Unit (Adv. Required)	Ratings	Cost	Notes
Battleship (Steel)	18/12/4	160	Possesses a two-space sea visibility range. These behemoths were made for hard-hitting naval attacks and shore bombardment. Although relatively slow, their high attack and defense value justifies their high cost.
A/C Carrier (Advanced Flight)	1/12/5	160	Possesses a two-space sea visibility range. The Aircraft Carriers's value lay in its ability to carry 8 air units (including Nuclear). While the more units carried, the more cost efficient an Aircraft Carrier becomes, if sunk, upwards of 1000 points of production can go down with the ship! To avoid sinking, Aircraft Carriers must, of necessity, be escorted by other ships and carry fighters for their own defense.
Fighter (Flight)	4/2/10	60	Possesses a two-space visibility range. Fighters have a flight duration of one turn; they must end each move at a city or Aircraft Carrier or be destroyed. They may make an unlimited number of attacks per turn and are the only units that can attack Bomber units "in the air."
Bomber (Advanced Flight)	12/1/8	120	Possesses a two-space visibility range. Bombers enjoy two turns flight duration and so can fly "8 out and 8 back." However, staying out at the end of the first turn leaves them vulnerable to enemy fighters. Like Artillery units, Bombers ignore enemy City Walls when attacking and are devastating against both land and sea targets, thus justifying their high cost.
Nuclear (Rocketry + Manhattan Project)	99/0/16	160	These one-shot weapons are the most powerful in the game. Although cities which posses SDI defenses are invulnerable, enemy units in the open (particularly enemy fleets) are highly vulnerable to nuclear attacks. The drawbacks of pollution aside, keeping a Nuclear unit or two handy for emergencies is usually a good idea, particularly to stop an invasion fleet.

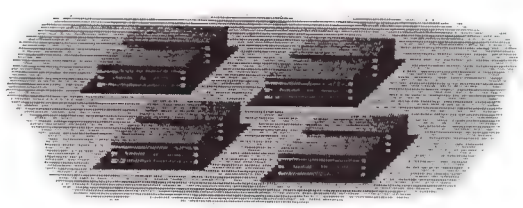
Tactics, Tips and Techniques

That's not what I meant by marching on your stomachs!
— Napoleon Bonaparte?

Below are several warfare tactics, tips and techniques which will help in waging war and other matters military.

- Veteran units are 50% stronger on attack and defense. Thus, it is wise to have these units whenever (and wherever) possible, but particularly so on the attack since it is the only favorable modifier for an attacker. There are two ways to create veteran units: have a regular unit survive a battle (at which time it has a 50% chance of being rewarded with veteran status), or create veteran units at cities which possess Barracks. It is a far more certain proposition in the latter case. Barracks are incredibly cheap (40 shields and 0 maintenance per turn; i.e., 40 + $0/turn) for what they produce (veteran military units). Wherever possible, they should be built, for an all veteran army is a practical necessity for a civilization to not only thrive, but also to merely survive. Furthermore, Barracks also prevent the random event of Pirates near the city.

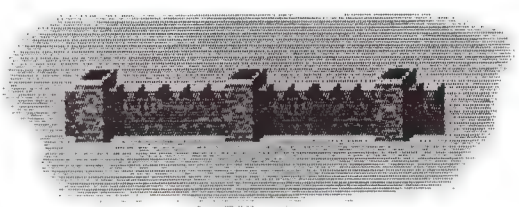
- Barracks, however, become obsolete with the invention of Gunpowder, and again with the invention of Combustion (be sure to sell them all off just prior to the discovery of these advances, and use the money raised to buy them back). They disappear from every city within your civilization and, when reconstructed, bear an increased maintenance cost of 1 and 2 coins each, respectively. This means that in the middle and late stages of the game, although the shield cost remains cheap at a constant 40, the overhead burden of Barracks must be considered. If that is the case, Barracks should be built in priority locations. Basically, the cities which can build units quickest (i.e., have the largest production level and are nearest the front lines) and support them (with shields and, for the representative governments, with happy



citizens) should have priority in receiving Barracks. These cities will allow one to mobilize the most efficiently during times of war.

- Because stacks of units can be killed in a single battle if they are not defending in a city, with one exception, never stack units outside of cities. The one exception is that moving a unit with a high defense value (such as a Phalanx, Knight, Musketeer, Rifleman or Mechanized Infantry) adjacent to an enemy city (preferably in good defensive terrain like mountains, hills, etc.) and fortifying it there creates an opportunity for an attacker to besiege the city. When stacked with these fortified units, high attack/low defense value units (such as Chariots, Catapults, Cannons and Artillery) can bombard away at the city, relying on the fortified, high defense value unit to defend it against sorties from within the city, and relief forces from without. That exception of laying "siegeworks" aside, particularly when maneuvering across open terrain (land or sea), stacking units only risks more losses on the single throw of the dice. Sure, units which are stacked together cannot be bribed by Diplomats, but since the computer players seldom attempt to bribe units, this is an insignificant consideration. Don't stack units.

- City Walls, while not cheap to build (120 shields) and maintain (2 coins per turn), offer a positive and long-lasting effect. These "miniwonders" not only eliminate Flood disasters in their city, but also increase the defense strength of each unit in the square by tripling it. Compound this with the added benefit that should units in the city be destroyed the population is no longer reduced, and the cumulative effects of City Walls is most impressive.

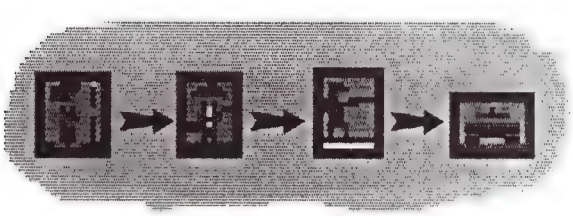


- During a war, speed is of the essence in maneuvering troops. In order to save your city which is under attack, it is vital to get reinforcements there quickly. To press an advantage against an enemy city, waves of fresh attackers

often need to be brought up. While the computer advises building cities close together for their mutual defense, that is not enough. Your empire must be linked by roads (and rails) as soon as possible. Furthermore, when attacking a distant enemy on the same continent, it might be advisable to create a Settler unit to be the "corps of engineers" for the army, building a road to the "front" in order to speed the arrival of reinforcements. That same "engineer" unit can also build a fortified outpost (once construction is discovered) to help set up defensive lines or prepare siegeworks.

- The smart way to have units defending in a city is to fortify the high defense strength units and put the high attack strength units on sentry duty. Many players wrongly fortify their Chariots, Catapults, Cannons and Artillery inside a city. This is a bad idea because these units are much more effective using their attack factors than having their pathetic defense factors increased by a lousy 50%. When placed on sentry duty in a city, any enemy unit which moves adjacent will automatically wake them up, affording them a chance to, more often than not, attack them first. You must be careful when ships depart from the city (as units on sentry duty automatically are loaded into them), but since fortified units often fail to awaken before they get a chance to attack that turn, it is always better to have these high attack strength units ready for a quick counterstrike, rather than waiting in a prepared defense.

- Since you can't do enough to ensure the safety of your own cities, upgrade defending units as soon as possible. Specifically, a city will often start with a regular Militia unit as its Garrison. This should be upgraded to a Phalanx as soon as possible (remember, it's not only other civilizations, but pirates and barbarians that you must worry about). A regular Phalanx should, likewise, be upgraded to a veteran Phalanx when available. Upgrade Phalanx units to Musketeers, to Riflemen, to Mechanized

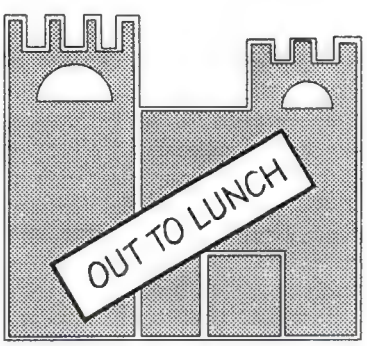


Infantry (if desired), and replace normal units with veterans at every opportunity. Always keep the highest and best defenders fortified in the cities and build SDI Defense improvements at every large (8+ population) city.

- A couple of interesting ploys can be done when geography creates an isthmus for you to control. These offer you a narrow frontage upon which to build an impenetrable land defense and also to build a "Panama" canal at these land bridge/bottlenecks.

  It all begins by building a single city (if the land is only one square wide between the oceans). If the isthmus is more than one land square wide, build multiple, adjacent cities to create a usable canal between the oceans. (Ships can actually move from city to city "across the land" in this manner; pretty slick, eh?) Next, fortify these locations to the hilt. Make sure there is a navy handy in order to prevent the enemy from slipping along either coastline (which you will be able to go back and forth between at will). Station battleships or carriers in "the canal for a highly secure and a militarily useful canal.

- Representative governments should never talk to foreign emissaries while winning a war against them. All too often the enemy makes a peace overture, which your Senate will force you to accept. If winning a war, don't take a chance by leaving the job half finished. Refuse to speak to a dying enemy when the Senate might stab you in the back. Remember, the best time to kick people is when they're down!



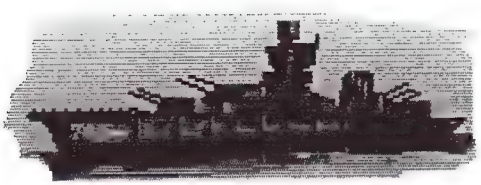
- For several hundred years, Knights (4/2/2) will be the queen of the battlefield. Develop them early and use them extensively. Until Gunpowder is discovered (at which time Musketeer units at 2/3/1 appear with their good defense strengths and all barracks disappear), Knights have the highest speed and defense, and the second highest attack strength in the game. Although not made formally obsolete until Armor appears, fortified

Musketeers behind City Walls and the enemy Cannon units (8/1/1) will severely limit the offensive and defensive possibilities of Knights. The computer will often build hordes of Knights during play and with good reason. Emulate this smart play.

- When you discover Physics, you might be tempted to advance toward Magnetism (and Frigate units) before the Steam Engine (and the Ironclad unit). Here's a simple rule of thumb: "Frigate me not" in battle. Their attack strength is too low (at 2) to risk the investment, particularly if their high transport capacity (of 4) is currently in use. Frigates can fight against Trireme and Sail units, if desired, but only when empty and the risk of loss is therefore minimized.

- Early on in the game, all navies are far too precious to be frittered away needlessly. Their exploring capabilities and cargo carrying capacities make them important workhorses that, once built, should seldom need to be replaced. Therefore, don't do any shore bombardment with Trireme, Sail or Frigate units (particularly since land units are more often veterans, get terrain defense bonuses and are generally fortified when found in cities). Wait until Ironclads adorn the fleet, and then shore bombard and fight naval battles with them as much as desired.

- At the top of the "attack strength food chain" lies the Battleship, with its 18 strength (27 if a veteran unit). You should attack and bombard with these behemoths at every opportunity. By using them to spearhead an invasion, not only can you clear the beaches but you can also literally empty out all of the defenders in a city so that units can walk in straight off the transports! This technique of eliminating city defenders by shore bombardment for an easy capture will carry the day against all but the most strongly held coastal cities, so use it!



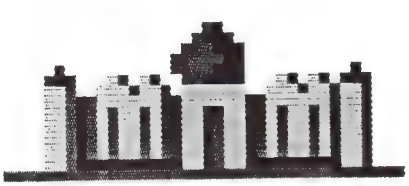
- Conversely, Battleships and Carriers are also the units

with the highest defense strength in the game (12 each, or 18 if veterans). While in a port, although they do not enjoy the terrain benefits of land units, they do receive the tripling defensive advantage of City Walls (if not attacked by Bombers and Artillery units). Consequently, Battleships and Carriers can be a real pain to the attacker when defending in a port. Having a Battleship lying in ambush at a port to blunt an invasion spearhead and lead the counterattack against the enemy armada is an ideal way to turn the tables on an invader. Additionally, keep a Battleship handy when defending an isthmus port. Nothing will stop an attacker colder than these "Panama Pop Guns."

- Individually, Submarines are pretty well worthless. However, they are cheap (like Transports) at 50 shields apiece. For the price of a single Battleship or Carrier (160 shields), one can acquire 3.2 Submarines. This implies, rightfully, that Submarines are best used in wolf packs of three or more. Since they are marginally stealthy (in that they are only able to be spotted by adjacent units), if they can concentrate on a single larger ship, between the group of them they should, mathematically, be able to kill it with enough tries.

  More importantly, they are also useful for denial of sea lanes. What this means is that a blockade of a certain highly traveled open ocean routes (i.e., sea-lanes) by a carefully deployed screen of submarines can block access to foreign lands by enemy cargo ships. If an enemy can't move his troops off of a continent, his ability to project power overseas is rendered impotent.

- One way of conducting a war against another civilization is particularly effective: capture the enemy's capitol (i.e., his Palace). Their starting cities are listed in a table earlier in this chapter. Keeping in mind the problems of stacking units (pg. 265), Bombers and Artillery are the units of choice to lead such an effort since they can ignore City Walls. As most players are aware from bitter experience, losing your Palace causes widespread



corruption and dissent until a new one is constructed. Use the enemy's period of disruption for aggressive conquest and bribery attempts.

- Some cities are tough nuts to crack. They might be too expensive to subvert and too strong to conquer. In that case, consider cutting them down to size first. While Diplomats can soften them up with some sabotage, military units should pillage the countryside around such major cities and bring their local economy to its knees.

  Of course, it's not always practical to waste land units to devastate the countryside of a strong enemy who will just pop out from behind the City Walls and counterattack. Therefore, use Bombers for pillaging. Yes, Bombers can pillage like any other unit, and are especially useful for harassing "pillage" raids where one has local air superiority (i.e., there are no enemy Fighter units nearby). This is usually a safer gambit than attacking units behind City Walls for the Bombers, as there is no combat which risks their destruction. Bomber pillaging is also the perfect way to break vital enemy military roads and railroads so that their troops can't easily redeploy to areas one might care to threaten.

- Since the only unit that can attack a Bomber while it is in the air is a Fighter unit, blocking land and sea routes with Bombers is an excellent ploy. While this will *not* work in a city (where air units are vulnerable to all forms of attack), leaving a Bomber stacked in every crucial friendly occupied square creates an ultimate defense versus land and sea attacks against it. For example, you can besiege a city with a stack of Artillery units in a single square and fly a Bomber unit over them to prevent the enemy from counterattacking against the otherwise vulnerable Artillery units. In other words, don't use that Bomber to attack enemy units in the city. Instead, fly "air patrol" over the besieging Artillery units to protect them. Even though the enemy might roll up a huge army and armada against this "Bomber protected" square, it will only be

vulnerable if the enemy has a Fighter handy to destroy the Bomber first so that the units it is protecting will be exposed.

Along this same line, Bombers can be used to block narrow transportation routes. Is the enemy marching down an isthmus or sailing through a narrow waterway? Is there a strategic link in his military road or railroad line within Bomber range? If so, Bombers can be deployed to sit right on top of those spaces and block enemy movement through them! Unless the enemy had enough forethought to bring some Fighter units with him, you can be boxed out quite efficiently with Bombers.

- Timing is everything. Therefore, use the WAIT command (the **W** key) so that units can be maneuvered in an optimal order. You should maneuver your fastest, best defending units first to make sure that the "coast is clear" for the later movement of units with vulnerable defense factors. For example, move Knights into enemy territory in advance of the Catapults and Chariots each turn, so that the Catapults do not end up adjacent to an undiscovered enemy unit which will easily destroy them. The same is true for Armor and Mechanized Infantry in advance of Artillery units, Cruisers in advance of Transports, etc.

- The surest way to ensure a successful outcome in any battle of *Sid Meier's Civilization*, is to do it over and over again until it comes out as desired. To that end, save the game before every important battle. If the results are not satisfactory, reload the saved game and repeat as necessary until a satisfactory result is achieved. While technically cheating, this technique is really only practical in situations where the outcome is truly in doubt. Replaying impossible odds attacks and defenses will become quite boring and the game will lose much of its play value if this technique is abused. If fate turns wildly against you, however, a handy saved game will usually right any egregious wrongs, hopefully teaching a lesson

on correct troop employment or diplomatic positioning as a result of replaying your missteps.

Of Bribery, Theft, Sabotage and Diplomacy

Trust me!

— Machiavelli?

Believe it or not, the best offensive unit in the game has a zero attack factor. It is the Diplomat unit. After the development of writing, the pen immediately proves itself mightier than the sword by allowing you to create these mischief making masters. When backed with enough money (the "sinews of war"), the damage they can cause is almost limitless. Here is a quick overview of what Diplomat units can do in, more or less, their order of usefulness:

Table 7-7. Diplomat Actions

Endeavor	Coin Cost?	Diplomate Fate
Bribe Unit	Yes	Survives
Establish Embassy	No	Destroyed
Steal Technology	No	Destroyed if successful
Incite a Revolt	Yes	Destroyed if successful
Industrial Sabotage	No	Destroyed
Investigate City	No	Destroyed
Meet with Ruler	???	Survives

The Art of Diplomatic Warfare

Bribery

Diplomats are useful for recruiting enemy pieces to your own side by bribing them. Where this can be the most devastating is having a Diplomat sit on a friendly, front line city and wait for the enemy to come knocking at the door (particularly the slow, heavy hitting Catapult, Cannon and Artillery units). The

newly recruited unit, however, will not be able to move until the new owner's next turn.

Note that the Diplomat unit is *never* at risk when attempting to bribe a unit (a contradiction to the statement on page 39 of the rules book which indicates that failure to bribe a unit destroys the Diplomat). Since there is no down side to attempting to bribe a unit (a failed attempt doesn't even end the Diplomat's movement for the turn), if you want to bribe multiple units, a single Diplomat (backed by large quantities of cash) is all that is necessary to buy every enemy unit it can contact. Therefore, with a single Diplomat and a lot of cash, you can not only blunt an attack against a friendly city, but create the nucleus of an army with which to repay the enemy's aggression!

Interestingly, the computer players very seldom bribe the human player's units (and never attempt to incite riots in other player's cities). Don't make this mistake. Bribe enemy units like crazy! Here's the formula used for determining the cost to bribe a given unit:

Bribery Cost Formula

Bribe = ((Funds + 750) / (Dist + 2)) * Cost

Bribe = Bribe / 2 if unit is not a Settler
Funds = Enemy's treasury
Dist = Distance from enemy Palace in squares (diagonal squares count as approximately 1.5 squares distance)
If no Palace, Dist = 32. If barbarian, Dist = 16
Cost = Build cost / 10 (i.e., Legion = 2)

Translated, that means it will be more affordable to bribe cheaper units (Cost) from poorer enemies (Funds) who are further away from their capitols (Dist). Also, Settler units will cost a LOT more than other units. Remember, an enemy's treasury level is known if one has an embassy established!

Here's a final tip on bribing units: Become the scourge of the seas. Yes, enemy ships can be bribed (as can Bombers in mid air) as long as they are not stacked with other units (thus, enemy Carriers and Transports, if loaded, will not be susceptible to bribery). By having Diplomats near the coast to counter enemy shore bombardment, or roaming the high seas like pirates on friendly ships, a wealthy player can rapidly

purchase a navy by jumping Diplomat units aboard enemy vessels.

Embassies

Diplomats' primary functions, however, come into play when they move into an enemy city. The first Diplomat in should almost always establish an embassy. For the rest of the game, you will be informed of the other civilization's position in the game both through your Intelligence Advisor (i.e., by hitting the F3 key), as well as by the great historians. Knowing the enemy's treasury level (particularly as it applies to the formulae presented in this book), number of military units possessed and whom that player is at war and peace with are all vital to successful decision making. To that end, the long-term benefits to an embassy are considerable.

Stealing Technologies

After the first Diplomat establishes an embassy, stealing technologies is a particularly useful pastime. While you will not get to choose which technology gets stolen as you will after conquering a city (assuming there is more than one in which you lag behind), it is still worth expending the Diplomat unit in order to save a lot of valuable R&D time. Note that there is a limit of one technology per enemy city per game that can be stolen. This only applies to the human player (the computer players are handicapped here by only being allowed to raid the human player's cities once per *game*, not once per *player* per game). This limit applies for the human player even if a "plucked" city is later conquered by another civilization (the people in the city remember one's past misdeeds, apparently).

Note that this requires a state of war to initiate, so players at peace with their opponents cannot simply flood their borders with Diplomats, stealing a technology from every city, and not have to worry about the political consequences. This is particularly important for the representative governments of The Republic and Democracy, since Senate approval is necessary in order to steal technologies. On a final note, always be sure to use a Diplomat to steal a technology from a

city prior to its conquest whenever possible. In that manner, you can double dip from the enemy's technology pool.

Inciting Riots

Inciting cities to riot and revolt is something which must be weighed carefully. Often, it is simply more practical to employ military units against an enemy city and take the risks involved in conquering it. Representative governments, in particular, will often find themselves in a position where they are long on cash and short on military units. For such occasions, when you have more dollars than sense (ahem), this form of economic warfare is a very tidy (albeit expensive) way of expanding one's empire. Note that an enemy's capitol city is not subject to bribery, and that you will have to use military force at some point in order to completely crush an opponent.

When you are not at war, Diplomats backed up by enough money will be offered a chance to pay double the cost to subvert the city. The only difference between paying the normal cost and paying double that to subvert it (besides the money) is that paying subversion converts the city without causing a war to break out. In other words, there are no messy political consequences from your peaceful neighbor. In either case of revolt or subversion, the city and all of the units in it, and nearby that it supports, join you.

Dissident Cost Formula

Bribe = (Funds + 1000) / (Dist + 3) * City size

Bribe = Bribe / 2 if city is in disorder
Funds = Enemy's treasury
Dist = Distance from enemy palace in squares (diagonal squares count as approximately 1.5 squares distance)
If no Palace, Dist = 32. If barbarian, Dist = 16

In other words, it is more economical to incite revolts in cities belonging to poorer neighbors (Funds) that are furthest away from their palace (Dist). Furthermore, it's always half price to bribe an enemy city in disorder.

Industrial Sabotage

If a city has already had its technological pockets picked, and

you are too poor to buy its loyalties by inciting a revolt, performing industrial sabotage is a reasonable, if not always cost effective, proposition. When you consider the benefits versus risks of industrial sabotage, the balance sheet is often, but certainly not always, positive. This option is particularly useful for governments at peace with their neighbors but who still wish to cause them some mischief. Industrial sabotage can be conducted without triggering a war (and thus, without requiring Senate approval for representative governments).

On the benefits side, an expensive unit (or even a wonder) being constructed by that city might be disrupted. Unfortunately, you will not know if the enemy was one turn into production or one turn away from completion without expending another Diplomat on an "investigate city" mission.

Likewise, the city's walls might come tumbling down, making the city easier to attack. However, something much quicker and easier to replace (like a Temple, Barracks or Granary) is just as likely to be destroyed, making your own cost in expending a precious Diplomat of negligible value. Industrial sabotage is a hit or miss proposition at best, and should really only be used when you are out of cagey ideas for your diplomatic corps. Since Diplomats, like Caravans, require no shields to maintain nor do they cause sad faces when they depart their cities, it is often wiser to keep them safe in the heart of your empire until just the right moment, rather than expend them frivolously.

Investigating Enemy Cities

Because of their dynamic, changing nature, it is usually not wise to expend Diplomats in the task of investigating cities. As the immediate precursor to an attack, perhaps, as a means of seeing exactly how many units might be defending a city (usually, computer players will garrison their cities with from three to five land units), such reconnaissance might be beneficial. Hunting around to find an enemy's Palace might be another practical ploy for investigating a city (but Palaces seldom move from a civilization's first established city, and when they do it is usually announced in a popup window). Still, the loss of a Diplomat is a high price to pay for a mental

"snap shot" of a city that will be building improvements and new units, while shuffling troops in and out all the while. Such intelligence is very fleeting.

Meeting with the King

Meeting with a Ruler on your own terms is no better than meeting with him at his behest. Consequently, unless you are currently enjoying the benefits of either the Great Wall or United Nations wonder (or playing at the Chieftain difficulty level), it is often pointless to bother. One exception might be when you are conducting wars on several fronts and want to buy a peace with one neighbor or another (assuming they'll even listen).

While the formula for determining the amount of tribute demanded by haughty enemy leaders is complicated, it can be explained simply. Basically, the number of attack factors the enemy leader has on continents where you have cities is compared to the number of attack factors the player has on continents where the enemy leader has cities, modified by the difficulty level selected for the game (see Chapter 2). There are also modifications for possession of nuclear weapons (more if the enemy has them, less if the player has them).

If you launched a sneak attack against the enemy leader, the price demanded doubles. If you have recently captured one of the enemy's cities, the price is reduced. When the enemy leader demands tribute, if he wants more than you have, he'll ask for it all, rounded down to the nearest $50. If the enemy leader wants twice as much as you possess, there will be no demand for tribute made. Instead, the player will only be notified of the continuing state of war.

Summary

Let slip the docs of war.

—Shakespeare?

The astute gamer should have learned several valuable principles in this chapter that can keep his/her civilization from being broken into "peace"s. You should have conquered some practical political principles for advantageous treaties

and declarations of war; tricky tips for masterful military maneuvers; triumphant techniques for drafting, deploying and destroying military units; artificial intelligence reports on artificial opponents; and diabolical deeds for dirty (but effective) diplomats.

Chapter 8

Will Wonders Never Cease?

Imagine visiting Egypt and ignoring the pyramids or travelling to China and failing to view the Great Wall. Not only were these ancient constructions awe inspiring during their respective eras of usefulness, but they still garner multitudes of pilgrims in the modern world. As Lowenthal stated in *The Past is a Foreign Country*, "The shiver of contact with ancient sites brings to life their lingering barbarity or sanctity". As time travellers in *Sid Meier's Civilization*, you will find that it is equally preposterous to ignore the colossal achievements and benefits represented by the wonders of the world. Further, the expenditure of resources that is required to construct a given wonder should cause you to stop and ponder the objective of creating such a "monument" within your civilization. This re-enactment rather underscores the historical lesson to be learned from each specific wonder.

There are twenty-one wonders in *Sid Meier's Civilization*, seven available in each epoch of earth's history (antiquity, the Middle Ages and the Industrial Age). Whenever your civilization has reached the technological baseline necessary to create a wonder, it will appear on each of your cities' "Build" menus. Establishment of various wonders not only increases the glory of your civilization (by adding to your overall score, increasing your chance of being recognized for having one of the top five cities, having your citizens expand your Palace and being rated as one of the most advanced civilizations), but also provides additional benefits specific to the wonder itself. When it is important to speed up construction or establishment of a wonder, you can accomplish this by sending a Caravan unit into the city where the wonder is being created. You will receive a message in a popup window asking whether you want to continue travelling; establish a

trade route or contribute to building the wonder. If you contribute to the wonder, the value of the Caravan will expedite work on the wonder. The best news about wonders is the fact that there is no per turn maintenance cost required to keep them functional.

Warning: On occasion, a city's Build menu will feature an "X" prior to the listing of a potential wonder to be constructed. This means that the wonder *can* be built, but that it is already obsolete in terms of usefulness within the game context, meaning that it no longer performs its unique function as a wonder.

How to Use This Chapter

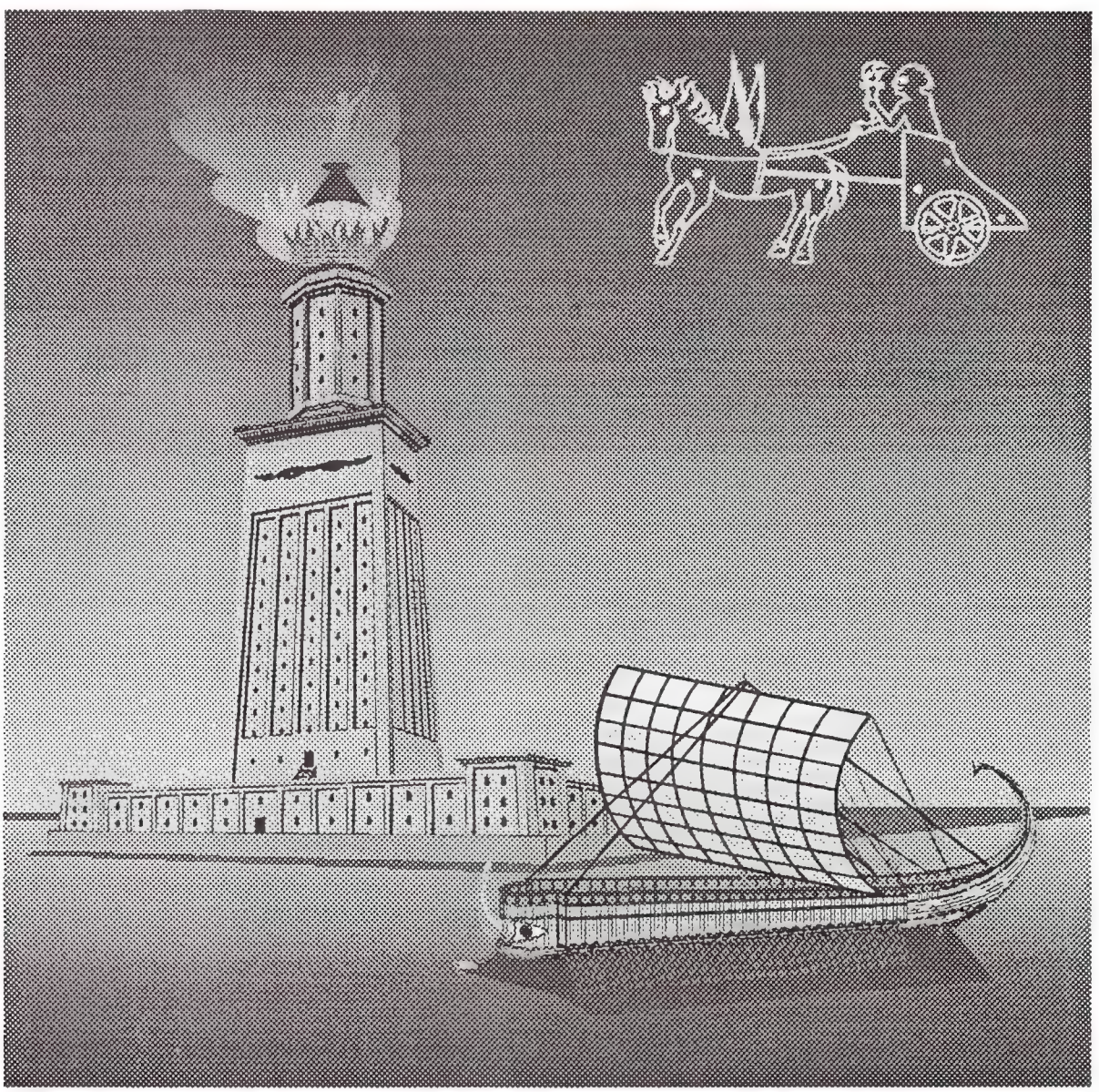
Blueprints are but a pale shadow of my work.
— Frank Lloyd Wright?

This chapter provides an alphabetical (as opposed to chronological) reference to "wonder-working" which should allow you to check the blueprint (prerequisites, costs and potential benefits) against the needs of your specific situation. It is designed for quick reference with a few historical notes and strategic considerations for game play provided on the left-hand page and a chart (for information at a glance) positioned on the right-hand side of the page. Novices may want to read all of the information provided on both pages, while experienced gamers will probably gravitate to the charts as quick reference material.

Playing Tip: In some games, particularly at the higher difficulty levels, the computer civilizations may build the wonders so quickly and efficiently that it will be less expensive in the long run for you to gather wonders by *conquest* rather than via construction. This will often be true when you are forced into taking a hostile position against neighboring civilizations and find that you are using most of your resources for the war effort. When you conquer rival cities that already have wonders completed within them, you automatically receive the full benefits of those conquered wonders. In fact, you can use the wonders of the world report (the F7 key) function to determine which cities have

completed wonders and concentrate your military efforts on those cities.

A word of warning is necessary with regard to the strategy just described. Whenever cities are *destroyed* rather than simply *conquered*, the wonders within them are also destroyed and may *not* be rebuilt. Naturally, this also means that you will want to make sure any cities which contain wonders are walled cities so that the wonders are *not* destroyed and you have an opportunity to recapture them at a future time.



Artwork courtesy of David Livingwood of Dayton, OH and Corel Systems Corp.

Apollo Program

It's only a paper moon.

— Werner von Braun?

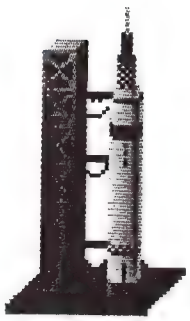
In October of 1957, the Soviet Union fired the first shot in the struggle between the superpowers that was to become known as the *space race*, the artificial satellite known as Sputnik 1. This was followed, months later, by the first U.S. launch, Explorer 1, and Vanguard 1 (which established the viability of solar cells as a power source).

Although it appeared that the satellites launched between 1957 and 1961 were being used to monitor weather, radiation and micrometeor migrations, neither superpower nor their allies had forgotten that rocketry had its genesis as a delivery system for destructive payloads. So, shortly after Yuri Gregarin's successful space flight on April 15, 1961, President Kennedy announced the establishment of the Apollo Program and its explicit objective of putting a man on the moon before the end of the decade (and ahead of the Soviets). In July of 1969, the goal was fulfilled as Neil Armstrong made that small step which represented such a great leap for mankind.

In *Sid Meier's Civilization*, the successful culmination of the Apollo Program enables *all* civilizations that have advanced far enough to begin constructing their space arks. The major advantage for being the successful civilization that "launches" such a program is the fact that you immediately discover where all the other cities of the world are located.

Playing Tip: You will want to build the Apollo program when facing one of two situations (which may be intertwined). First, if you are having trouble finding the last couple of outposts of an enemy civilization you are trying to destroy or if you are not far from conquering the entire world and want to make sure you've conquered all of the rival cities. Second, if you believe that you have a significant technological lead over the computer opponents, you can exploit that lead by inaugurating the Apollo Program so that you can already have your space ark launched before they even start building theirs.

Apollo Program



Epoch: Industrial Age

Category: Space

Cost to Produce: 600

Advance Required: Space Flight

Made Obsolete by: Not Applicable

Game Function

All civilizations with the technology may begin to build their space arks and all Cities (only) on the map are revealed to this wonder's owner.

Notes

Well, SOMEONE has to discover the Apollo Program! Unlike the Manhattan Project, at least the builder of this wonder gets a special benefit in being allowed to see where every city in the still unexplored areas of the world are. For those ready for the space race, blast off! The game ends soon, you know.

Apollo Program

Johann Sebastian Bach's Cathedral

A would-be composer must take notes.
— Wolfgang Amadeus Mozart?

It would actually be impossible to identify Bach's Cathedral with any *one* actual place. Bach held official church positions and composed important religious compositions in various locales. In his early period (1707-1713), he held a post at the Blasiuskirche in Muhlhausen which gave him opportunity to compose the famous *Toccata and Fugue in D Minor* and *Prelude and Fugue in D Minor*, as well as to publish his first written composition in 1708, the cantata known as *Gott ist mein Konig*.

After a stint as court musician (at both Weimar and Kothen), Bach became responsible in 1723 for the music of, not one, but four churches in Leipzig (Peterskirche, Neukirche, Nikolaikirche and Thomaskirche). From 1723-1744, Bach composed such works as: *The Magnificat, St. Matthew's Passion, St. Mark's Passion, The Christmas Oratorio* and *The Ascension Oratorio*.

Although you cannot tie the creative work of Bach to a single cathedral, the amalgam known as Johann Sebastian Bach's Cathedral in *Sid Meier's Civilization* is intended to evoke the rich inspirational structure of Bach's music and apply its religious function in creating a sense of awe, gratitude and acceptance. In game terms, the construction of this cathedral as a repository for Bach's music serves to decrease (by two) the number of unhappy citizens in *every* city that shares the same continent with the city that built the cathedral. To emphasize the idea that Bach's music will never die, this wonder *never* becomes obsolete.

Playing Tip: J.S. Bach's Cathedral is a *must* if you want the efficiency of a representative form of government without the drawbacks. Whereas it is often a good idea to change government type before entering into a military campaign against another civilization (losing efficiency), you can use the buffer (i.e. reducing the unhappy citizens in each city by two) created by Bach's Cathedral to allow your government to stay efficient without having cities going into anarchy at every turn.

Johann Sebastian Bach's Cathedral

Epoch: Middle Ages

Category: Happiness

Cost to Produce: 400

Advance Required: Religion

Made Obsolete by: Never

Game Function

Decreases the number of unhappy citizens by two in every city on the same continent.

Notes

One of the two medieval wonders which never becomes obsolete, Bach's Cathedral is continental in its effect and should be built on the land mass where a player has the most cities. It is particularly useful at higher difficulty levels and when a representative government sends troops off to war.

Johann Sebastian Bach's Cathedral

The Colossus of Rhodes

Now there's a figure who'll test my metal (sic).
— Doc Savage?

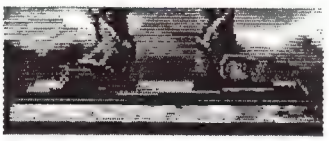
Although *colossi*, huge statues which typically represent gods or demigods, were present in many civilizations (Nebuchadrezzar's statue described in the book of Daniel; the Diabutsu (Great Buddha) in Japan; and Sphinx of Egypt), the most famous of all was the one hundred foot tall statue of the sun god, Helios, which stood at the entrance to the harbor at Rhodes. This bronze statue, sculpted by Chares of Lindus, was reinforced with iron, anchored with stones and took approximately one dozen years from inception to completion. Less than a century after it was completed, an earthquake caused enough structural damage to break off the statue's body at the knees (thus, the graphic in the game).

Sid Meier's Civilization describes the colossus in the game as straddling the harbor, a legendary fallacy often attributed to the Colossus of Rhodes. This is highly unlikely, but cannot be proven. Whether the statue actually straddled the harbor or not is immaterial. The purpose of the statue in the game is to accentuate the privileged status of the trading harbor of Rhodes. So, construction of the colossus within the game's framework means that you will get an *extra* trade (arrow) unit for every city square that is already generating a trade unit.

In history, the Romans punished the Rhodans for joining a rival alliance by creating a rival port at Delos. Since there can only be *one* Colossus in *Sid Meier's Civilization*, you need not worry about this transpiring. The discovery of electricity causes this wonder to become obsolete, however, so you need to build it early in order to reap its benefits while your civilization is still "ramping up" for future development.

Playing Tip: Those of you who prefer building to military campaigning should make this your civilization's first monumental undertaking (after you are sure you can protect the city where you build it). Try to keep all the squares producing in the prospective Colossus' city's sphere of influence, since trade units are only added to squares that are producing trade arrows.

The Colossus of Rhodes



Epoch: Antiquity

Category: Trade

Cost to Produce: 200

Advance Required: Bronze Working

Made Obsolete by: Electricity

Game Function

One additional set of trade arrows is created in every City Map square which already generates some trade at the city where it is built.

Notes

Wonders don't come any cheaper than this, and having the Colossus is "good for business" in that city. Add a representative government and watch the trade roll in! Electricity is far enough away to make the Colossus a good investment if built early enough.

Copernicus' Observatory

Keep your sunny side up!
— New Jersey Legislature?

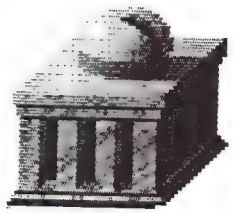
Nicolaus Copernicus (1473-1543) was a Polish canon who served, primarily, as a financial clerk for the local bishop. He developed the heliocentric theory of the universe while following his avocation of studying mathematical theory and astronomy. His classic work, *De Revolutionibus Orbium Caelestium*, paved the way for the works of Kepler and Galileo which eventually provided the wrecking ball for the Ptolemaic theory of the solar system (a stationary earth).

Though Luther called Copernicus an "upstart astrologer," Copernicus' theory did not engender much controversy until, decades later, there were sufficient improvements in methodology and instruments to "prove" the solar system was heliocentric. This "proof" occurred when Galileo's use of the telescope allowed him to discover the four moons of Jupiter, the phases of Venus and the oval appearance of Saturn. All of which had not been accessible to earlier "naked eye" astronomers and added evidentiary kindling to the fire of the Copernican system.

Sid Meier's Civilization uses Copernicus' Observatory as a metaphor for the shift from the Ptolemaic solar system to the Copernican. Though there was no *actual* observatory in history, this wonder allows you to cut your civilization free from the dogma of theology and speed scientific advancement. The Copernicus' Observatory wonder *doubles* light bulb (knowledge) production in the city in which it is placed. Unfortunately, this wonder becomes accessible only shortly before its inevitable demise with the onset of automotive technology at an early point in the Industrial Age.

Playing Tip: Since this doubling of knowledge (light bulb) production occurs *after* all of the other calculations and adjustments, this can be a very valuable wonder whenever you have a civilization which is rather isolated and you want to get a technological head start on other civilizations prior to invading their continents.

Copernicus' Observatory



Epoch: Middle Ages

Category: Technology

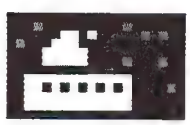
Cost to Produce: 300

Advance Required: Astronomy

Made Obsolete by: Automobile

Game Function

Doubles the light bulb production in the city after all adjustments for Libraries, Universities and Einsteins.



Notes

One of the less expensive medieval wonders, Copernicus' Observatory is also one of the quickest to become obsolete because of the high desirability of the Automobile advance. For smaller empires or ones with a single great trading city, this wonder can reap considerable rewards.

Copernicus' Observatory

Cure for Cancer

Some things you can't joke about.
— Johnny L. Wilson and Alan Emrich?

Cancer is a generic term for approximately one hundred interrelated diseases caused by an inexplicable multiplication of abnormal cells. It is the second-leading cause of death in the United States and affects approximately one-fourth of the population. All of the higher forms of animals and some plants have shown evidence of cancerous tumors at one time or another.

At the time of the writing of this book, no *cure* for cancer was available. Treatment relied upon early detection and a triumvirate of techniques: surgery, radiation and chemotherapy. No technique had been one hundred percent successful and research was continuing on viral agents which might be able to reverse the course of the disease.

Since *Sid Meier's Civilization* requires Genetic Engineering as a prerequisite for discovering the Cure for Cancer wonder, it appears that this type of Cure for Cancer would be based on cell repair machines built by nanotechnology. K. Eric Drexler, in *Engines of Creation: The Coming Era of Nanotechnology*, observed that modern biologists already tag proteins with antibodies, use enzymes to cut and splice DNA, and create viral syringes to inject edited DNA into bacteria. He has suggested that the cell repair machines would "compare DNA molecules several cells, make corrected copies, and use these as standards for proofreading and repairing DNA throughout a tissue." The nanomachines would compare each cell's structure with that of healthy cells as recorded in a database and, like a proofreader checks spelling, would check amino acids in the abnormal cells.

In the game context, the reward is not commensurate with the investment. All the Cure for Cancer wonder accomplishes for you is to add one happy citizen to every one of your cities.

Playing Tip: Only discover this wonder when you need a morale boost across your entire civilization. It would not be a disaster if your opponents discovered this one before you.

Cure for Cancer

Epoch: Industrial Age

Category: Happiness

Cost to Produce: 600

Advance Required: Genetic Engineering

Made Obsolete by: Never

Game Function

The modern equivalent of the Hanging Gardens, the Cure for Cancer creates one additional happy citizen in all of its owner's cities.

Notes

While having an additional happy citizen in every city is nice, just about any other modern wonder should be given priority over the Cure for Cancer, depending on one's particular circumstances. In this game, cure some of your civilization's other problems before bothering to cure cancer.

Cure for Cancer

Darwin's Voyage

Well, I'll be a monkey's uncle!

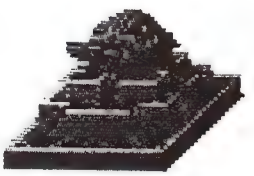
— John T. Scopes?

The *H.M.S. Beagle* set sail on December 27, 1831 on a mission to chart the coasts of South America and set up chronometric stations for the British Admiralty. The ship's naturalist, assigned to accomplish these tasks, was Charles Darwin. It took six years for him to catalog and publish his observations in journal form. Then, it took twenty years and a shot in the arm from fellow naturalist, Alfred Russel Wallace, for Darwin to apply the principle of natural selection to what he observed on the trip and actually *publish* his theories on July 1, 1858.

Although Darwin followed the advice of his scientific mentor, Charles Lyell, and attempted to avoid theological controversy, such controversy was inevitable. Whether you see Darwin as a honest investigator of truth or a destroyer of the faith, the publication of his theories revolutionized scientific inquiry and loosed much of the scientific process from the apron strings of the clerics. It is in this sense that *Sid Meier's Civilization* lists Darwin's Voyage as a wonder. Successful completion of the voyage immediately gives you the technological advance your civilization is currently studying, plus one more advance of your choice. Once these immediate advances have occurred, there are no other specific, continuing benefits with regard to this wonder.

Playing Tip: As noted on the chart, immediately receiving the advance which your wise men have been studying may not be much of a bargain. If you have railroad technology before any of the computer's civilizations, you can safely raise taxes or the luxury rate and reduce knowledge (light bulb) units until the wonder is completed. This will maximize your potential so you don't waste resources on an advancement that would come with the completion of the wonder, anyway. Do *not* use this stratagem if the Railroad technology is available to other civilizations. You could lose too much if you reduce your light bulb production and a computer-controlled civilization manages to complete the wonder first.

Darwin's Voyage



Epoch: Middle Ages

Category: Technology

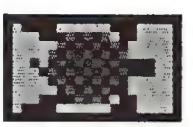
Cost to Produce: 300

Advance Required: Railroad

Made Obsolete by: Not Applicable

Game Function

Immediately gives the player the rest of the light bulbs required to finish the advance currently being researched, plus one other advance.



Notes

While relatively inexpensive, it is unfortunate that the first advance is the one the player is currently researching and might have been discovered next turn anyway! Therefore, considering turning off the light bulbs (by raising taxes or the luxury rate) when researching Darwin's Voyage.

Darwin's Voyage

The Great Library of Alexandria

Shhh!

— Ptolemy I?

Built shortly after 300 B.C. to house both books and scholars, the Great Library of Alexandria has come to symbolize the wealth of knowledge to be transferred by the written word. The original idea for the construction of this ancient repository of wisdom is reputed to have come from Alexander the Great himself. Ptolemy I designed the facility and Ptolemy II built it in the 3rd century B.C. The library functioned smoothly from that point until well after the 1st century A.D. The original goal of the Great Library was to collect every available Greek text in the world and arrange the scrolls in a systematic order to facilitate the writing of commentaries on those texts.

The Great Library wonder in *Sid Meier's Civilization* represents the collation of a large body of knowledge, as well. As a reward for constructing this repository of knowledge, you receive for free any advanced technology which, at least, two of the competing civilizations have already discovered. This reward can be of inestimable value whenever several civilizations are advancing ahead of your own and you need to catch up.

Playing Tip: Wait until you are certain that other civilizations have advances that you need. Then, construct the Great Library wonder as swiftly as possible, supplemented by Caravans and additional funds.

Note: The playing tip may be unnecessary if you are close enough to one of the advanced civilizations to send a Diplomat to one of their cities. It is much cheaper to "steal" the technology in such circumstances than it is to build the Great Library wonder. Of course, the Great Library wonder is a necessity if you want to remain at peace with your neighbors, since the theft of technology would immediately cancel the peace treaty and provoke hostilities.

The Great Library of Alexandria

Epoch: Antiquity

Category: Technology

Cost to Produce: 300

Advance Required: Literacy

Made Obsolete by: University

Game Function

The owner receives any technology that TWO other civilizations have acquired.

Notes

The higher the difficulty level being played and/or the more isolated one's starting location, the greater will be the need to possess The Great Library. The "free" advance it gives a player will keep him/her from falling too far behind. When ahead in the "technology race," a player may safely skip this wonder.

The Great Library of Alexandria

The Great Wall of China

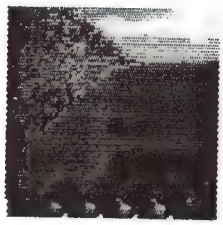
Now, where will I get that much wallpaper?
— Emperor Shih Huang-ti? (Builder of the Wall)

Although the manual for *Sid Meier's Civilization* states that the Great Wall was not built to keep invaders out as much as to keep them from getting away easily with the ill-gotten gains of their looting, it is almost certain that the Great Wall had a deterrent effect on invading barbarians. The deterrent effect was primarily that of delaying and reducing the inevitable attacks, not stopping them altogether, but the case has been advanced (as noted by Will Durant in *Our Oriental Heritage*) that, "Rome fell because China built a wall." That is, the Huns moved south for easier pickings against the crumbling Roman Empire rather than attempting to breach the defenses symbolized by the wall.

The Great Wall was the product of ten years of labor. It was 1,500 miles long and so impressive that Voltaire is reputed to have said that the pyramids were "puerile and useless masses" in comparison with it. Eventually, the wall was unable to stop the Tatars from conquering the northern territories and destroying the Han Dynasty. *Sid Meier's Civilization* celebrates the deterrent effect of the Great Wall wonder by requiring all civilizations to conclude each parlay by offering a peace treaty to owner of the wonder.

Playing Tip: Since this wonder only requires Masonry knowledge as a prerequisite for its construction, it can be built fairly early in the game. Indeed, since the invention of Gunpowder makes the wonder ineffectual (presumably because of the potential explosive strength in breaching the walls, as well as the devastating power of weapons with an extended range), this wonder is best constructed early or not at all. It is most effective when you are initially positioned on a large continent with more than one hostile neighboring civilization. Being able to immobilize your neighbors on the continent while exploring other lands (or performing an end run to establish cities behind their lines) can be extremely advantageous.

The Great Wall of China



Epoch: Antiquity

Category: War

Cost to Produce: 300

Advance Required: Masonry

Made Obsolete by: by Gunpowder

Game Function

In a parley, other civilization's leaders always end by offering you a peace treaty.

Notes

The usefulness of the Great Wall depends on how surrounded a player's civilization is. The more enemies on one's borders (particularly hostile ones like the Zulus and Mongols), the better the Great Wall looks. Anyone's discovery of Gunpowder can arrive quickly, however, ending this wonder's usefulnesss.

The Great Wall of China

The Hanging Gardens of Babylon

I talk to the trees, but they don't listen to me.
— St. Francis of Assisi?

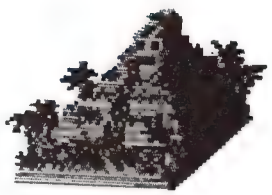
Usually attributed to King Nebuchadrezzar (sometimes to Queen Sammuramat, mother of Adad-nirari III), the Hanging Gardens were most likely terraced roof gardens which were built to emulate the grassy slopes of gentler climates. Nebuchadrezzar reputedly built these gardens for his Median wife, Amytis, when she missed the verdure mountains of her homeland. Trees, bushes and varied plants were given enough soil to become rooted atop the roofs and, in the absence of rain, slaves would man hydraulic pumps (hidden within the massive columns which supported the garden terraces) in order to irrigate the gardens with water from the Euphrates.

Interestingly enough, no certain physical evidence of the Hanging Gardens exists (outside of classical references to the gardens as one of the Seven Wonders of the World). A German archaeologist named Koldewey once uncovered some unique foundation chambers and vaults, including an unusual looking well, in the northeastern quadrant of the palace at Babylon. He thought this might be part of the substructure of the Hanging Gardens, but no pump machinery has been found to help substantiate this.

In *Sid Meier's Civilization*, your civilization will not have to know Engineering or Masonry to construct the Hanging Gardens wonder. Only Pottery is necessary. The upside to this wonder is that its beauty adds one happy citizen to the population of all your cities. The downside is that the development of Invention enables everyone to see through the mechanical underpinnings, making it obsolete.

Playing Tip: This is an excellent wonder to build first. Although it will become obsolete fairly quickly, its primary benefit (adding one happy citizen to each of your cities) will probably keep you out of plenty of trouble with cities going into civil unrest or your entire civilization going into anarchy. It is even more valuable as you advance in difficulty level, because fewer citizens are "born content" at the higher levels of difficulty and this wonder provides extra breathing room.

The Hanging Gardens of Babylon



Epoch: Antiquity

Category: Happiness

Cost to Produce: 300

Advance Required: Pottery

Made Obsolete by: Invention

Game Function

One additional happy citizen is created in all of the owner's cities.

Notes

The greater the diffculty level, the greater will be the need for the Hanging Gardens since fewer citizens will be "born content" in each city. Still, it's not a tremendous value. Invention is a quick discovery, usually making the Hanging Gardens the first ancient wonder to be made obsolete.

The Hanging Gardens of Babylon

Hoover Dam

The best dam wonder around.
— Benjamin "Bugsy" Siegel?

Construction on Boulder Dam, a hydroelectric project built across the Colorado River, began during Herbert Hoover's administration in 1930. Standing over 700 feet tall in the midst of Black Canyon, near Las Vegas, Nevada, the dam generates about one million and a half kilowatts of electricity when running at full capacity. It was renamed Hoover Dam in 1947 in honor of President Hoover.

The upside to hydroelectric power is the fact that it is a clean and efficient way of generating electricity. The downside to this type of energy harvesting is that it requires special sites. As noted in Chapter 4's discussion of smaller hydroelectric plants, *Sid Meier's Civilization* only allows you to build hydroelectric plants near rivers or mountains, simulating the fact that most of the potentially valuable sites for hydroelectric plants have already been exploited.

The best news about the Hoover Dam wonder is the fact that, once you have built it, you never have to build any other energy source on the continent where it is located. Since regular hydroelectric plants cost four coins per turn to maintain and Hoover Dam offers the same value with *free* maintenance, it is easy to see how valuable the latter can be.

Another major benefit is that the game assumes that the presence of the wonder will keep your civilization from using more heavily polluting sources of energy. So, the presence of the Hoover Dam wonder will reduce your civilization's *industrial* pollution by 50%.

Playing Tip: Begin construction on the Hoover Dam wonder as soon as you have the knowledge of Electronics. If possible, use Caravan units and extra funds to speed up construction so that the computer-controlled civilizations cannot build it before you do (negating your potential advantage). Once you have constructed the Hoover Dam, you will want to sell back any pre-existing energy sources on that continent to net extra cash and save the per turn maintenance costs.

Hoover Dam

Epoch: Industrial Age

Category: Resources

Cost to Produce: 600

Advance Required: Electronics

Made Obsolete by: Never

Game Function

The Hoover Dam is equivalent to having a Hydro Plant in every city on the continent where it is built, increasing production and reducing pollution.

Notes

The number two "must have" wonder, the effect of having a free Hydro Plant in every city on the same continent cuts industrial pollution by 50% and, if a city possesses either a Factory or Mfg. Plant, adds 50% more shields from its base resource production. A great wonder by a dam site!

Hoover Dam

Isaac Newton's College

I wouldn't give a fig for today's education.

— Socrates?

Trinity College of Cambridge is Isaac Newton's College, whether you are thinking about the college where Newton matriculated in order to "read" (study) mathematics and mechanics or the college where he was elected "fellow" and later, full professor. In 1669, Newton was privileged to succeed his own mathematics professor, Isaac Barrow, as Lucasian professor of mathematics.

At this point in time, Newton was primarily interested in mathematics as it applied to astronomy and optics. In fact, it was to be 1684 before Newton became involved in his most famous and remarkable work, the theory of gravity. It took approximately eighteen months for him to complete the *magnum opus* which we often call the *Principia* (*Mathematical Principles of Natural Philosophy*).

In game terms, Isaac Newton's College represents the ideal of academic freedom that Newton stood for when he was elected to parliament and the free exchange of ideas that can advance the cause of learning as a result of said freedom. As a result, this wonder really accelerates the expansion of knowledge by increasing light bulb production up to 166% in each city that has both a Library and University. Unlike the generic university improvement described in Chapter 4, however, Isaac Newton's College does not require any per turn maintenance costs.

Playing Tip: It is particularly important to build this wonder as soon as possible whenever you are playing at one of the higher difficulty levels. If you have Libraries and Universities already in place by the time you construct this wonder, it can really help you play "catch up" to any civilizations that are more advanced than your own.

Isaac Newton's College

Epoch: Middle Ages

Category: Technology

Cost to Produce: 400

Advance Required: Theory of Gravity

Made Obsolete by: Nuclear Fission

Game Function

Increases light bulb production bonus of all Libraries and Universities from 50% each to 83% each (for a total, when both exist in the same city, of 166%).

Notes

This snazzy little wonder is perfect for empires with larger numbers of cities, most of which are producing their share of light bulbs. The broad increase in light bulb production lasts for quite a while although, eventually, what goes up (Isaac Newton's College) must come down (with Nuclear Fission).

Isaac Newton's College

The Lighthouse of Alexandria

Come on baby, light my fire.
— Jason and the Argonauts?

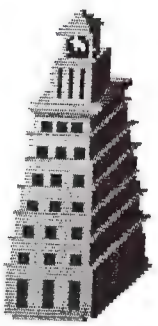
In the era described in Homer's *Iliad* and *Odyssey*, signal fires on the tops of coastal hills or mountains provided the light for mariners to return to shore. The earliest known lighthouse, per se, was that constructed on the island of Pharos, in the harbor of Alexandria, Egypt. This lighthouse, built in honor of Ptolemy II circa 280 B.C., stood between 350 and 440 feet high (estimates vary) and had a statue of either Alexander the Great or Ptolemy I in the guise of the sun god, resting above the signal fire. Classical writers listed this man-made lighthouse as one of the original Seven Wonders of the World known in antiquity and its famous navigational aid made the island a critical base in several naval campaigns.

By the time of Nero, man-made lighthouses were commonplace enough that any decent harbor was said to house one. These lighthouses simply burned wood or coal and were, if important, covered by a roof so that they would not be doused in inclement weather. It was not until the Middle Ages that oil lamps and candles came to be used as the light source.

As presented in *Sid Meier's Civilization*, the Lighthouse wonder is to be perceived as equivalent to the lighthouse built on Pharos. It is to be perceived as a vital wonder to construct when your civilization has its initial starting point on a small continent or island with limited room for expansion. Since it is so cheap to build, it hardly matters that it will be one of the first wonders to become obsolete. The slight advantage it will give seafaring civilizations at the outset can be worth the cost.

Playing Tip: In most games, you will want to be able to reach new continents at an early point in time. Building the Lighthouse wonder provides that extra movement point that can make the difference between a Trireme finding a safe crossing to another continent or being lost at sea. Naturally, this is not an important wonder to build if you find yourself starting on a large, unexplored continent.

The Lighthouse of Alexandria



Epoch: Antiquity

Category: Exploration

Cost to Produce: 200

Advance Required: Map Making

Made Obsolete by: Magnetism

Game Function

The sea movement rates of the owner's ships are increased by one square per turn.

Notes

The Lighthouse is one of the two cheapest wonders and expires rather painlessly with Magnetism and its Frigate unit. It can greatly help the human player explore by allowing his Triremes to sail two spaces away from a coastline, and two back, which is important when starting on a small island.

The Lighthouse of Alexandria

Magellan's Expedition

Who do you think you are, Columbus?

— King Charles V

On September 20, 1519, Ferdinand Magellan departed on a three year mission to circumnavigate the globe and find a strait at the tip of South America which would provide a more expeditious route to the Spice Islands. Magellan was to face heavy seas, mutiny, underprovisioning and thieving natives in the course of discovering the Straits of Magellan in 1520.

Next, Magellan migrated northwest along the coast of South America, ostensibly looking for trade winds that might take him to spice islands other than those controlled by the Portuguese. In so doing, he found the optimal route that, according to Daniel Boorstin in *The Discoverers*, is recommended by the U.S. government to this very day. Unfortunately, Magellan did not survive to completely circumnavigate the globe. Having reached the Philippine islands, he became convinced that the King of Cebu had converted to Christianity. As a good Catholic, he believed it was his duty to assist the King of Cebu in battle against the infidel King of Mactan. Magellan died, according to his chronicler (Antonio Pigafetta), from poison arrows as he attempted to cover his men's retreat. In 1522, the remainder of his crew returned to Spain.

Sid Meier's Civilization celebrates Magellan's contribution to the breaking down of geographical barriers and establishing a naval tradition by rewarding your civilization with one extra movement point for all of your ships. This advantage not only means that you can move further, but it also allows more potential attacks per turn. Further, since the benefit *never* becomes obsolete, it is a wise investment should you desire to control the seas.

Playing Tip: Fund the Magellan's Expedition wonder as soon as possible after you gain the Navigation advance required as its prerequisite. The extra movement can both help you get out of naval engagements you do not wish to fight (such as when your ships are inferior to those of your opponent) and help you close on unwitting enemy vessels.

Magellan's Expedition

Epoch: Middle Ages

Category: War

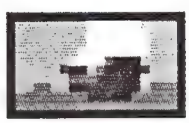
Cost to Produce: 400

Advance Required: Navigation

Made Obsolete by: Never

Game Function

Sea movement rates for all your ships is increased by one, allowing them to move further and conduct more attacks per turn.



Notes

One of the two medieval wonders that never becomes obsolete, Magellan's Expedition can be very useful (particularly on a world with a small land mass) in establishing a permanent naval tradition. If sea control looks like it might be important, make sure to get this wonder.

Magellan's Expedition

Manhattan Project

Can't anyone here just mix a simple drink?
— Harry S. Truman?

In 1939, Albert Einstein warned President Roosevelt of Nazi experiments with nuclear fission. Since FDR believed that it would be disastrous for Germany to obtain this weaponry before other nations, he formed a special department to oversee the development of the atomic bomb. The original code name for this top secret project was the "Manhattan Engineer District." It represented think tanks and work groups at five different locations across the United States. The goal of the project was, of course, to create a massive weapon of destruction and the result of the project was the creation of the atomic bomb. The bomb, of course, was dropped on Hiroshima in August of 1945 and completely burned out 4.4 square miles and killed more than 70,000 people.

Since the process used to create the atomic bomb was nuclear fission, *Sid Meier's Civilization* requires you to have the knowledge of Nuclear Fission before creating the Manhattan Project. Since the United States' possession of atomic secrets did not deter any other countries from developing nuclear weaponry and the advantage of being the sole nuclear power was short-lived, the game does not give you any specific advantage for founding the Manhattan Project. To the contrary, all civilizations benefit (?) equally from the effort and, if they possess Rocketry, may begin to build Nuclear units.

Playing Tip: Don't bother with this wonder. Conventional warfare is much more advantageous than nuclear warfare in *Sid Meier's Civilization*. Why rush to blow up the world when you can conquer it without all the pollution?

Manhattan Project

Epoch: Industrial Age

Category: War

Cost to Produce: 600

Advance Required: Nuclear Fission

Made Obsolete by: Not Applicable

Game Function

Allows all civilizations with Rocketry to build Nuclear units.

Notes

SOMEONE is going to build the Manhattan Project and open up a nuclear can of worms and everyone is going to benefit (?) equally (except for the wonder's 20 Civilization Points). All things considered, spend the 600 resources on something more permanently useful to your civilization.

Manhattan Project

Michelangelo's Chapel

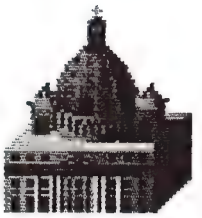
All you ever do is lie around and paint.
— Michelangelo's Mother?

When Pope Julius II decided to assign Michelangelo Buonarroti to paint the ceiling of the Sistine Chapel (the private chapel of the papacy in the Vatican which was originally built by Pope Sixtus IV), the artist protested that he was a sculptor rather than a painter and tried to get the pope to commission Raphael instead. Julius paid Michelangelo over 3,000 ducats to paint the ceiling and the process took over four years, even though Michelangelo had several helpers.

Julius is said to have had a series of portraits of the apostles in mind for the ceiling, but Michelangelo conceived of scenes from Genesis that would celebrate the unity of man's body, mind and spirit. In *Sid Meier's Civilization*, the game mechanics take their cue from Sir Kenneth Clarke's *Civilization* when the scholar says that the chief concern of the artist was the *spiritual* life of man, as opposed to historians who state that he was obsessed with the physical aspects of man (due to the multitude of nudes in the frescoes). Therefore, the wonder has the capacity of increasing the Cathedral effect (see Chapter 4) and becomes obsolete when the pure secularism of Communism becomes active in the game.

Playing Tip: You should refrain from building this wonder unless you already have Cathedrals in the majority of your cities. The placating effect of religious fervor provided by this wonder is too short-lived to be worthwhile if you are not prepared to exploit it from the outset.

Michelangelo's Chapel



Epoch: Middle Ages

Category: Happiness

Cost to Produce: 300

Advance Required: Religion

Made Obsolete by: by Communism

Game Function

Cathedral improvement effect increased by 50%, now making six unhappy citizens content in each city.

Notes

While one of the less expensive of the medieval wonders, the time between the discoveries of Religion and Communism can be all too short, indeed. If one should build this wonder, a massive Cathedral construction program must be undertaken to fully enjoy its benefits (which can be very impractical).

Michelangelo's Chapel

The Oracle at Delphi

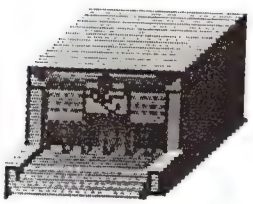
Don't worry. Your destiny lies in the future.
— Nostradamus?

Greeks and barbarians alike sent embassies to the temple of Apollo in Delphi in order to gather wisdom from the gods. Ancient sources tell us that the temple had three priestesses (each over 50 years old) who functioned as mediums for the sun god. At the time of the divination, a gas is reputed to have been released from the basement, where Apollo had allegedly slain a python, and Pythia, the pseudonymously named high priestess, would go into a trance. Pythia would inhale the gas, chew on narcotic laurel leaves and begin to mutter unintelligibly. Priests would then "translate" the message from the gods to those awaiting divine instruction. As Will Durant noted in *The Life of Greece*, "in most cases, the voice of the oracle harmonized melodiously with the dominant influence in Greece."

The suggestion that the divine instruction dispensed by the priests may have been influenced by the established power structure fits well with the function of the Oracle in *Sid Meier's Civilization*. In the game, constructing the Oracle doubles the number of unhappy citizens who are converted to contentment by the presence of Temples. It makes your Temples twice as effective and underscores the role of appeasement given to religion throughout *Sid Meier's Civilization*.

Playing Tip: Note that building a Colosseum to convert three malcontents into contented citizens costs 100 coins plus 4 coins per turn to maintain. Building a Temple to convert two malcontents into contented citizens only costs 40 coins plus 1 coin per turn to maintain. So, building this wonder to double the Temple effects (converting four malcontents per Temple) for 300 resources with *no* maintenance fees is extremely cost effective.

The Oracle at Delphi



Epoch: Antiquity

Category: Happiness

Cost to Produce: 300

Advance Required: Mysticism

Made Obsolete by: by Religion

Game Function

The effect of your Temples making two unhappy citizens content is doubled to making four unhappy citizens content.

Notes

One of the better ancient wonders, the Oracle can often avert a player's need for costly Colosseums until Cathedrals are at hand. The Oracle not only helps keep civil unrest in check, but also can be very good for the budget in the long run. Consequently, the Oracle is well worth a sacrifice.

The Oracle at Delphi

The Pyramids of Giza

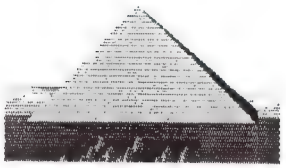
I hope no one catches onto my scheme.
— Thirteenth dynasty multi-level marketer?

In *The Making of Civilization: History Discovered Through Archaeology*, Ruth Whitehouse and John Wilkins suggest that the monuments of religion are largest when political power and religious authority are closely intertwined. Whether the Pyramid of the Sun in Teotihuacan, Mexico or the famous pyramids at Giza, these edifices linked the earthly rulers to their divine counterparts through their sheer size and extravagant construction costs. The size directed the eyes of the populace skyward and the manpower needed to construct these monuments proved that the ruler wielded tremendous authority over multitudes of laborers.

In *Sid Meier's Civilization*, the Pyramids serve to enhance your authority as ruler. If you have enough power to successfully build the Pyramids, you will have enough power to see your will through on any agenda. Therefore, the game offers you the opportunity to change governmental types *at will* without having to go through the moratorium of anarchy that civilizations normally undergo during such drastic transitions. Also, since the power of religious and secular authority is never *fully* divided until the arrival of communism as a secular religion, you do not have to worry about losing the advantage until later in the game.

Playing Tip: This is a particularly useful wonder to have if you expect to be moving back and forth from a wartime footing to a peacetime economy. The Pyramids will allow you to choose Democracy whenever you are attempting to build up your economy and to choose Monarchy or Despotism whenever you have to manage a military campaign.

The Pyramids of Giza



Epoch: Antiquity

Category: Government

Cost to Produce: 300

Advance Required: Masonry

Made Obsolete by: by Communism

Game Function

The owner may change governments without passing through Anarchy and may select from any of the five government types in the game.

Notes

The greatest ancient wonder, the Pyramids have the longest life (not expiring until Communism appears) and much to offer. The owner can switch between wartime and peacetime governments with the ease of drawing and holstering a pistol. Choosing from every government type is truly "wonder"ful.

The Pyramids of Giza

SETI Program

E.T. seldom phones home.

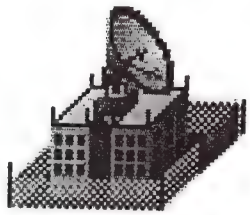
— E.T.'s mom?

In 1972, the first International Conference on Communication with Extraterrestrial Intelligence (CETI) was held under the joint auspices of the National Academy of Sciences of the United States and the Soviet Academy of Sciences. They drafted a formal recommendation that an international project be funded which would use radioastronomy as the basis of an attempt to probe deep space for intelligible electromagnetic signals. In addition, the United States has funded a national program called SETI (the search for extra-terrestrial intelligence) that has become a focus point for research and high-technological innovation.

In *Sid Meier's Civilization*, the SETI program assumes that your civilization has unilaterally begun the latter as a concerted attempt to locate and communicate with extra-terrestrial lifeforms. The massive amounts of data to be collected from this search and the focus of top-notch scientific minds on the problem would, presumably, cause peripheral discoveries and inspire additional inventions.

Playing Tip: Use the SETI wonder to invigorate your endgame research program. Be certain that you have plenty of Libraries, Universities and Einsteins in place before building this wonder or you will find that you have wasted some of its value. Since it never becomes obsolete, however, you can continue to add Libraries, Universities and Einsteins to get more advantage as the game progresses.

SETI Program



Epoch: Industrial Age

Category: Technology

Cost to Produce: 600

Advance Required: Computers

Made Obsolete by: Never

Game Function

Increases light bulb production in all cities by 50% after all adjustments for Libraries, Universities and Einsteins.

Notes

A fine light bulb generator, the SETI Program will rapidly get a player to Futuristic Advances. Possession of this wonder might well make pursuing Futuristic Advances (at 5 Civilization Points apiece) more worthwhile than turning off the light bulbs all together and going hedonistic. (See Chapter 9)

SETI Program

William Shakespeare's Theatre

I get how much for ghostwriting?

— Francis Bacon?

Built in 1598 and 1599 from the timbers which remained from Richard and Cuthbert Burbage's previous theatre (which was about to undergo demolition for the sake of some new type of development), the Globe Theatre was to become the most famous theatre of the Elizabethan era. Though the Burbages owned half interest in the theatre and the rest was divided between the acting company (The Chamberlain's Men) of which William Shakespeare was a part, it was because of the plays of Shakespeare that the Globe became famous.

The Globe was apparently an octagonal building with a thatched roof. There were three stories of galleries which surrounded the yard. The stage was at one end of the yard and took up about one-third of the area. The yard was open to the sky and the stage was lit by daylight. The acting company used three sides of the octagon for the backstage area and the other five sides were used for spectators. G. B. Harrison notes an estimate of the theatre's capacity in his *Shakespeare: Major Plays and the Sonnets* that may have been as high as 818 standing patrons and 1,526 sitting patrons for a total paid attendance of 2,344.

In *Sid Meier's Civilization*, the role of the arts is to provide a higher quality of life. It is interesting to note, however, that it is the invention of Electronics that makes stage drama obsolete in the game. Perhaps, this is a cynical observation about the relatively low quality of radio and television programming.

Playing Tip: There is no real reason to build this wonder unless you have plenty of funds and a reasonably large city that is full of potential unrest. If you can afford it, this wonder can buy you time as you use that large (and now, content) city to produce military units or desperately needed advancements.

William Shakespeare's Theatre

Epoch: Middle Ages

Category: Happiness

Cost to Produce: 400

Advance Required: Medicine

Made Obsolete by: Electronics

Game Function

All unhappy citizens in the city where this wonder is built stay content.

Notes

Shakespeare's Theatre can become rapidly obsolete. It creates a unique opportunity under a representative government to both increase the population of the city in which it is built by creating Elvii there and having several "We Love the President" days and also to send massive armies off to war.

William Shakespeare's Theatre

United Nations

Why didn't I think of that?

— Woodrow Wilson?

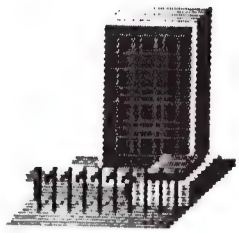
A spiritual, but not a direct, descendent of the League of Nations, the United Nations originated in the Allied alliance against the Axis powers of World War II. Forty-six of the original 51 nations involved in this organization for international peace had opposed the Axis forces directly during World War II, four others were admitted at the United Nations Conference on International Organization (San Francisco, April 25, 1945) and Poland was accepted as a charter member at a later date.

The primary task of the U.N. is to promote and maintain international peace and security. The General Assembly of the U.N. is the deliberative body wherein policy is established. The Security Council investigates threats to world peace and recommends settlements. The Economic and Social Council implements humanitarian and cultural activities for international cooperation and understanding. The World Court is available to arbitrate disputes (when both parties agree to be abide by the decisions) and offer advisory opinions to the General Assembly or Security Council.

That *Sid Meier's Civilization* presents the United Nations as a result of the Cold War is obvious from the fact that Communism must appear before the United Nations can be established in the game. It is an instrument of diplomacy within the game context and can allow breathing room for besieged civilizations whenever it is founded.

Playing Tip: If you are losing a military campaign against a stronger civilization, found the United Nations at one of the cities farthest behind your lines. Then, use a Diplomat to instigate a parley and accept the peace treaty until you can build up your civilization's strength enough to carry on the campaign.

United Nations



Epoch: Industrial Age

Category: War

Cost to Produce: 600

Advance Required: Communism

Made Obsolete by: Never

Game Function

The modern equivalent of the Great Wall, in a parley, other civilization's leaders always end by offering you a peace treaty.

Notes

It seems that other civilizations are less trustworthy in modern times, and peace treaties aren't worth the paper they're printed on. Sneak attacks abound, but the allure of a promised peace still beckons. Peace in our time? Even with the United Nations wonder, don't count on it lasting long in this game.

United Nations

Women's Suffrage

Men! Can't live with 'em. Can't vote without 'em!
— Susan B. Anthony?

The civil rights of women and racial minorities are intertwined. When women like Elizabeth Cady Stanton and Lucretia Mott attempted to participate in the World Anti-Slavery Convention (London, 1840) and were thwarted from joining the abolitionist cause, they determined that women needed to be enfranchised in order to be able to fulfill their moral ambition. Eight years later, another convention was held in Seneca Falls, NY. That convention passed a Declaration of Sentiments, heavily based on the Declaration of Independence, and focused upon women's suffrage as a primary objective.

By 1869, two organizations had been formed to carry the goal of women's suffrage further: the National Woman Suffrage Association (led by Stanton and Susan B. Anthony) and the American Woman Suffrage Association (led by Lucy Stone). Even with the vigorous efforts of these two organizations, it still took until 1920 before the 19th Amendment (granting the right to vote to women) was passed.

Sid Meier's Civilization rightly requires your civilization to wait until after industrialization to allow this wonder to be enacted. The Age of Industrialization was an age of labor organization and a dawning awareness of the rights of individuals *within* society as a backlash against the mechanization of that society.

Playing Tip: Ironically, the function that Women's Suffrage serves in the game is either to allow women to keep the hearth fires burning while the men go off to war or, possibly, to have them fight alongside the men. In either case, with this wonder, you won't have to worry about moving military units out of a city and making the populace too unhappy. Without the wonder, you will have trouble mobilizing your armies under the Republic or Democracy.

Women's Suffrage

Epoch: Industrial Age

Category: War

Cost to Produce: 600

Advance Required: Industrialization

Made Obsolete by: Never

Game Function

One less sad face is generated for representative governments when air units are built or other units leave their home city.

Notes

By far the number one wonder of the world to possess is Women's Suffrage. Reducing the greatest obstacle to military expansion under the highly productive representative governments, this wonder is the game equivalent of Thor's hammer or Zeus' lightning bolt. Go ye, therefore, and conquer!

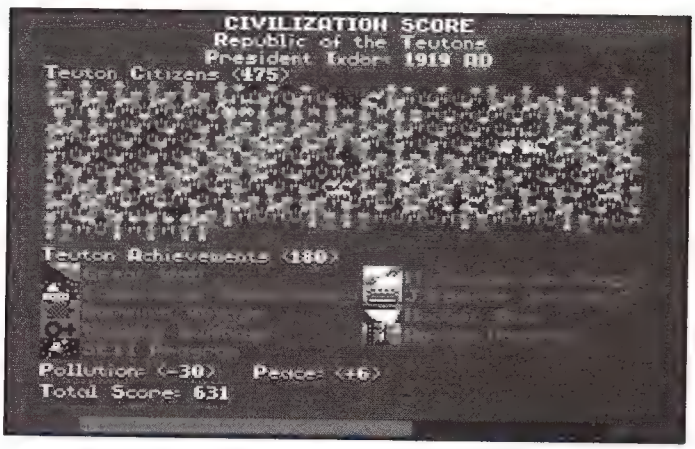
Women's Suffrage

Chapter 9

Have We Shown You Our Slides Yet?

Evaluating Your Game Performance

Just as the slides, videotape or home movies of a vacation can reinforce your memories of an entertaining trip, the scoring system in *Sid Meier's Civilization* offers a number of different ways to celebrate your playing experience. Many of the measurements for success are based on your Civilization Score. That score gets translated into various rewards such as the size of your Palace and a percentage rating on the "Dan Quayle" display. The PowerGraph, on-line Demographics (in the WORLD menu) and the rankings of the "Great Historians" are other indicators.



Civilization Score Display

The Civilization Score Up Close

Here is a line-by-line examination of what goes into your Civilization Score.

The True Worth of People

History shall judge my enlightened rule.

— Lyndon B. Johnson?

At the top of this screen is a roll call turn out of every citizen in your civilization. The computer counts heads and awards

two points for each happy citizen and one point each for content *and elite* citizen. (Yes, elite citizens are worth one point each.) Beneath this census is the tabulation of how much you have scored, based on your population.

Measuring Wonders

Will wonders never cease?

— Phineas T. Barnum?

Following the citizens are listed your total achievements for possessing the wonders of the world at the end of the game. A total score is given, followed by a listing of each along with its improvement roster icon. Each wonder is worth 20 Civilization Points. That means that each wonder is worth *another* twenty content citizens on the roster. Looking at that another way, each wonder is worth about the same as two medium (size 10) or one large (size 20) city in terms of Civilization Score.

Colonizing Alpha Centauri

Spaceward, Ho!

— Robert Kennedy?

Following the wonders is your Spaceship Score. Up to 200 points are possible here. You can earn 50 points for each complete set of life support, habitation and solar panel modules landed on Alpha Centauri. The Space Ark is capable of carrying up to four of each. Note that when the space ark is launched, there is a "probability of success" line on the Spaceship display. This represents what percentage of the possible score will be awarded if your spaceship is the first to colonize Alpha Centauri.

One important factor in keeping the probability of success percentage high is to run fast and lean. In other words, don't go off with a full set of four of each module and try to make the trip in as short a time as possible with more engines and fuel. A fully loaded Space Ark will consist of 35 structure modules, 16 components (eight each of fuel and propulsion) and 12 modules (four each of life support, habitation and solar panels). This fully loaded behemoth (which is pictured on page 57 of the rules book) will take 40 years to reach Alpha

Centauri and have an 80% probability of success yielding 160 Civilization Points if it is the first to make planetfall.

The Pollution Penalty

Hazardous waste is a state of mind,
and you've got a dirty mind!

— Ralph Nader?

The only negative scoring achievement is the existence of polluted squares on the planet. The **truth** about pollution is that *the player is responsible for every polluted square he can see.* This means that if you should nuke the enemy's heartland and cause several squares worth of pollution, each of those will penalize *your* Civilization Score if they are not cleaned up. This formula also applies to global warming, by the way. Only pollution squares that you *actually see* are calculated in the game formulae.

Each polluted square *subtracts* ten points from your Civilization Score. In effect, this cancels half a wonder of the world or the population score from a medium size city. Due to this large penalty, it is imperative that you keep the world clean and pollution free! Global warming doesn't *directly* show up on your Civilization Score, but polluted squares do. Clean them up as soon as they occur, whenever possible.

Fleeting Peace

Sic Transit Pax Mundi.

— Neville Chamberlain?

The next achievement you can make is peace. This is a very transitory category and worth three points per continuous turn of peace after the year A.D. 1. Peace is defined as no combat taking place between any two civilizations (barbarians are still fair game, however, and killing them does not upset the peace). The Peace Bonus is reset to zero once the units of any two civilizations fight each other. Therefore, short of being the world's police force, don't expect a huge Peace score in a hotly contested game.

Peace is indicated by a bar above the palace icon in the Palace window of the Map display. The bar grows one "square" at a

time per turn of peace. You can also find out the current peace bonus by checking your Civilization Score (the F9 key).

Note, however, that when you are playing at higher difficulty levels, it is cheaper for computer civilizations to buy military units than at the lower levels. Consequently, they have a tendency to buy more units which, in turn, causes the program's AI to have them play more aggressively. Therefore, at higher levels, making peace is a "now win" proposition and you are more likely to win via military than economic/diplomatic means.

Turning the Lights Out on Scientific Discovery

Life is too short to study. Party down, dudes!
— Werner Von Braun?

Futuristic Advances (or Future Tech) is another possible player achievement. Each such discovery made after the last advance has been achieved is worth five Civilization Points (the rules incorrectly state they are worth ten each). That is a quarter of a wonder, or one small (size 5) city in relative game terms. Thus, you can keep the lightbulbs burning to make these Futuristic Advances, which can pay off adequately if discoveries are still coming quickly during the game's end.

As a sound principle of playing strategy, however, you are usually wiser to shut down light bulb production entirely at this point, and selling off the Libraries and Universities (i.e., "go hedonistic"). One option, then, is to raise taxes, taking in hordes of money to buy city improvements, optimizing each city as quickly as possible for rapid growth. The second, and more intriguing option, is to crank out luxury items like the world (or the game, in this case) is about to end.

Luxury items produce two important benefits, the first being they make happy people (who are worth two points each, double the 1 point for a mere content or elite citizen) and these, in turn, spur city growth through "We Love the President" days. Since your population usually counts for a sizable part of your Civilization Score, this can inflate your Civilization Score post haste.

Along this line, you may want to build any Colosseums you

might have been putting off because of high maintenance costs. With the Universities and Libraries closed, use the revenues their sales generated to fund the construction of Colosseums for maximum "bread and circuses" prior to history's final judgment. You'll be well remembered (with a higher Civilization Score) if you do! Remember, Colosseums make unhappy people content, and contented people can eventually become happy people, given enough luxury items.

Another direct benefit of producing massive luxury items is the opportunity to create several "We Love the President" days. These will add rapidly to the total population when your government is either The Republic or Democracy. In *Sid Meier's Civilization*, it should be noted, that utopia for our age will not be discovered by further enlightenment through scientific advances, but rather by the hedonistic embracing of luxury items and money. (Cynics, no doubt, are making their comments about life imitating art.)

Global Conquest

Anything he can do, I can do better!

— Benito Mussolini?

The ultimate goal, of course, is to conquer the world. The bonus score achieved with global hegemony is 1000 points if the world is conquered on the A.D. 2000 game turn. This bonus score is modified by the following factors:

- *Plus* 2 points for each turn if achieved before A.D. 2000
- *Minus* 2 points for each turn if achieved after A.D. 2000
- *Minus* 100 points for each civilization less than the full complement of seven that you initially selected to begin the game with.

In short, conquering the world is well worth going for. Your civilization will enjoy the benefits of other civilizations' production, advances and wonders (all of which are liberated as their cities are conquered). This frees up your own R&D and civic improvement budget so that it can be pumped into the military. It might be worth it to see the "scrapbook" graphics of the other leaders in defeat at the game's end, but if

you take the road to world conquest, as MacArthur said, "there is no substitute for victory." In terms of *Sid Meier's Civilization*, you must either come home wearing your shield or *on* it.

Comparing Virtues Made Easy

The value of a good thing is to have done it.
— Grand Inquisitor Torquemada?

When examining all of the different elements of your Civilization Score, it might best be visualized comparatively using smaller numbers (which are easier to keep in mind). Use the table below to do so. The basic unit of measurement is a city with a population of five citizens (which is usually worth about five Civilization Score points).

Table 9-1. Relative Values for Civilization Scores

Feat	Value in "Units"
Each turn of peace	1/2
Build a small (size 5) city	1
Each Futuristic Advance	1
Build a medium (size 10) city	2
Each visible polluted square	-2
Build a respectable (size 15) city	3
Build a large (size 20) city	4
Each Wonder of the World	4
Build a huge (size 25) city	5
Each habitation module @80% success	8
Conquering the world on A.D. 2000	200
Each civilization less than 7	-20*

* Only if the world conquest bonus is awarded.

Measuring Success During the Game

Give a ruler an inch and he'll take someone's yard.
— Karl Marx?

There are three other types of measurements for success in *Sid Meier's Civilization*: those that can be seen during the game; those that can be seen when you retire before exiting the game;

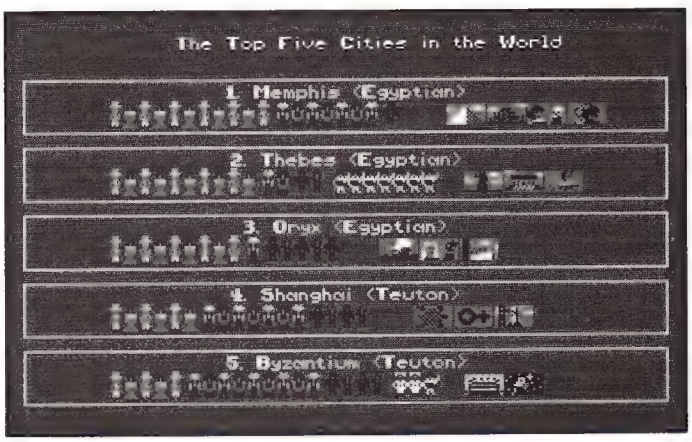
and those that can only be seen when the game is concluded: in the appropriate year, after world conquest or when Alpha Centauri is colonized.

The Top Five Cities

New York is a great city to live in!

— Boss Tweed?

Of the measurements of success that you can see during the game, most can be accessed any time under the WORLD menu on the Map display. The easiest one to interpret is the Top Five Cities Score (the **F8** key). Here, generally, the cities with the most wonders will usually dominate, because in computing the "top cities," ten points are awarded for each wonder a city possesses (half their Civilization Score value of 20), while two points are awarded for each happy citizen and one point for each content and elite citizen. This menu will show what wonders are where, and give you insights into how the computer players manage to control the sprawling populations of their cities. (For example, some cities will have half their population happy and half unhappy, some will have several Elvii, others will have none, etc.)



Top Five Cities Screen

Checking the Civilization Score

All I want is my place in the sun.

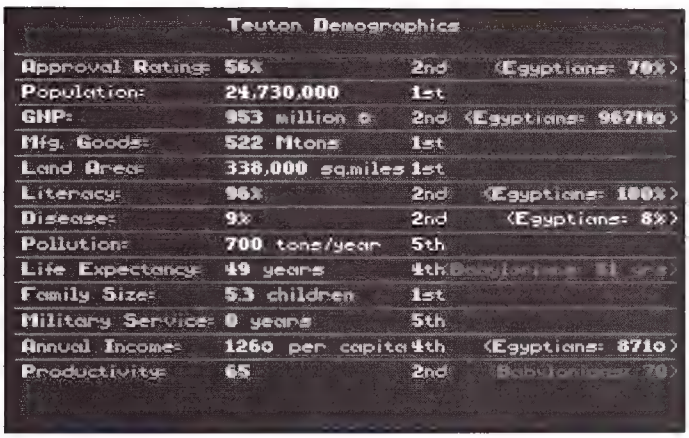
— Icarus?

The second measure is your own Civilization Score, accessible at almost any time by hitting the **F9** key. This, of course, was explained in greater detail in the preceding sections of this chapter, but it is a good idea to check it from time to time, particularly to gauge the exact amount of "peace" in the world, which should satisfy the curious.

The Census Consensus

Never mind who I am! Who are you?

— Dr. Livingston?



Teuton Demographics			
Approval Rating:	56%	2nd	(Egyptians: 70%)
Population:	24,730,000	1st	
GNP:	953 million $	2nd	(Egyptians: 967Mil)
Mfg. Goods:	522 Mtons	1st	
Land Area:	338,000 sq.miles	1st	
Literacy:	96%	2nd	(Egyptians: 100%)
Disease:	9%	2nd	(Egyptians: 8%)
Pollution:	700 tons/year	5th	
Life Expectancy:	49 years	4th	
Family Size:	5.3 children	1st	
Military Service:	0 years	5th	
Annual Income:	1260 per capita	4th	(Egyptians: 8710)
Productivity:	65	2nd	

Demographics Screen

A third, and fascinating measure of player progress that can be gauged any time during the game, is the Demographics display (sorry, there is no hot key for this feature).

Here, you can get a feel for how the empire is doing and, if embassies are established, how others are doing by comparison. One important note about the pollution line on the display, it doesn't matter at all before you discover Industrialization and pollution begins in earnest.

Demographics Formulae

Below are the different demographic categories, with the formulae as to how their results were calculated. Certain key words in the formulae are defined first.

Formulae Keywords:

Family = Total food produced - (2 * Size). I.e., "excess food produced"

Happy = Size + Number of happy people - number of unhappy people

Income = 2 * Total of all luxuries produced + Current Tax Income

Life = Total size from all cities that have Granaries + Total size from all Cities that have Aqueducts. (If all cities had a Granary and an Aqueduct, then Life would equal 2 * Size)

Literacy = Total size from all cities that have Libraries + Total size from all Cities that have Universities. (If all cities had a Library and a University, then Literacy would equal 2 * Size)

Manufacturing = Total Resources produced

Productivity = Total Food produced + Total Resources produced + Total Trade

Size = Total of all city size numbers

GNP (Gross National Product) = GNP = Income

Manufactured Goods = Manufacturing

Population = Total of the geometrically dynamic population of all cities

Approval Rating

Approval Rating = Happy * 50 / Size

If all people are content, you have a 50% approval rating. If all people are happy, you have a 100% approval rating. If all people are unhappy, give it up.

Land Area

Land Area = The total number of land squares "owned" * 1000 square miles

You "own" every square that his or her units were the last to pass through physically (not adjacent to, but through).

Literacy Rate

Literacy Rate = 2 * Literacy / Size + 4 (thus, the maximum range for this number would be from 4 to 8)

That total value is * 2 for each of the following advance: Alphabet, Writing, Literacy and University (thus, if a civilization has all for of these, the multiplier is 16).

This value is then adjusted so that the range is between 0 and 100%.

Disease

Disease = 50 * Size / (Size + Life)

If you have medicine, Disease = Disease / 2.

Thus, disease will range from 16% - 50%, or 8% - 25% if you have has medicine.

Pollution

Pollution = ((Total Resources / Dirty - 20) + (Population Pollution Level * City Size / 4)) * 10 tons per year

Population Pollution level (which is determined for each city, individually) is: Industrialization = 1; Automobile = 2; Mass Production = 3; and Plastic = 4.

Dirty = 1; with a hydro or nuclear plant in the city, Dirty = 2; with a recycling center in the city, Dirty = 3.

Life Expectancy

Life Expectancy = (1500 / (20 + Robust)) - (Pollution * (10 / Size))

Robust = 50 * Size / (Size + Life)

If you have medicine, Robust = Robust / 2.

Family Size

Family Size = 2 children + (4 * (Family / Size))

This will equal 2 children + 1 child per each 1/4 of a food excess produced per citizen icon.

Military Service

Average Number of Years = 10 * (The Number of Military Units / Size)

Annual Income

Annual Income = Income * Tech Level / Size

"Tech Level" is the total number of advances achieved (from 0 to 70, approximately, including any Futuristic Advances.

Productivity

Productivity Percentage = Productivity * 10 / Size

The number on screen, divided by 10, tells you how many items — food, resources and trade — an average square being worked in your civilization produces.

A Stately Pleasure Home, Indeed

There's no place like home...

— Freddie the Freeloader

The final measure of playing stature that can be measured during game play is the majesty of your Palace. While this entire display can be toggled off under the GAME / OPTIONS menu, it *is* an amusing diversion to build up your seat of power. You can always get a glimpse of your Palace (short of being interrupted to add another new tile to it) at a reduced size by examining an icon in the Palace window of the Map display. Note that this is also the display that contains the white "peace" bar in it, which shows your score for consecutive turns of peace by its length.

A maximum size Palace will consist of:

- Seven "building" sections numbered 1-7 with up to four improvements allowed per section
- One "road" section labeled "B" with up to three improvements allowed

- Two "hedgerow" sections labeled "A" and "C" with up to three improvements each.

Thus, a "maxxed out" Palace display would require 37 gifts from the nation's builders over the course of a game. The Civilization Score required for each such gift (or "tile") can be found in Table 9-2.

Your Palace is upgraded based upon your Civilization Score and modified by the difficulty level that the game is being played at. See Table 9-2 to find out what plateaus are required to build each improvement or tile on the Palace screen.

Table 9-2. Palace Improvements

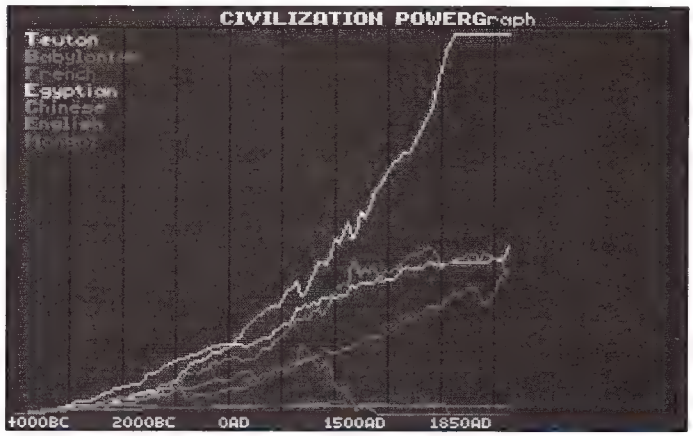
Tile #	Chieftain Level	Warlord Level	Prince Level	King Level	Emperor Level
1	4	4	3	3	2
2	11	10	8	7	5
3	22	19	16	13	10
4	36	31	26	21	16
5	53	46	38	31	23
6	74	64	53	43	32
7	99	85	71	57	43
8	127	109	91	73	55
9	158	136	113	91	68
10	193	166	138	111	83
11	232	199	166	133	100
12	274	235	196	157	118
13	319	274	228	183	137
14	368	316	263	211	158
15	421	361	301	241	181
16	477	409	341	273	205
17	536	460	383	307	230
18	599	514	428	343	257
19	666	571	476	381	286
20	736	631	526	421	316
21	809	694	578	463	347
22	886	760	633	507	380
23	967	829	691	553	415
24	1051	901	751	601	451
25	1138	976	813	651	488
26	1229	1054	878	703	527
27	1324	1135	946	757	568
28	1422	1219	1016	813	610
29	1523	1306	1088	871	653
30	1628	1396	1163	931	698
31	1737	1489	1241	933	745
32	1849	1585	1321	1057	793
33	1964	1684	1403	1123	842
34	2083	1786	1488	1191	893
35	2206	1891	1576	1261	946
36	2332	1999	1666	1333	1000
37	2461	2110	1758	1407	1055

Numbers in all but the first column represent the Civilization Score at a particular difficulty level required for the construction of the tile listed in the first column.

The PowerGraph

When I look back at all I accomplished, I could just die.
—Alexander the Great?

When measuring success in playing *Sid Meier's Civilization*, a second source of feedback is made available to you upon retirement. You retire whenever you are still in the game and it either automatically ends (either through a player conquering the world, by any civilization making planetfall on Alpha Centauri or when time expires at some point in the 21st century) or by selecting the Retire option from the GAME menu on the Map display. Upon retirement, you will be presented with the PowerGraph followed by the Dan Quayle Chart and the Hall of Fame.



The PowerGraph

The PowerGraph is a multi-colored line graph showing the amalgamate of each civilization's overall power rating over time. Time is measured along the bottom of the graph with each vertical line representing 50 game turns. Dates are indicated every hundred game turns and include: 4000 B.C., 2000 B.C., A.D. 0, A.D. 1500, A.D. 1850, A.D. 1950 and A.D. 1025.

The horizontal plane of the graph is not measured, except along the top and the bottom. Naturally, the bottom of the graph represents a rating of zero. The top of the graph is equal to a value of four thousand points, so civilizations with that score or higher "top out" along the ceiling of the chart.

PowerGraph Score

PowerGraph score = (8 * City Population Points) + Number of Advances + (Treasury / 32) + The "Value" of all Units

"Unit Values" are equal to their cost in shields to produce divided by ten. For example, a Militia unit = 1, Phalanx = 2, Bomber = 12, etc.

The "Dan Quayle" Display

All things considered, I'd rather be famous.
—J. Danforth Quayle

After the PowerGraph, you are shown Civilization Ratings on what has become known as the "Dan Quayle" display. This is just an amusing comparison to some famous leaders in history and where you would have ranked among them (in Sid Meier's opinion, remember) upon your retirement. You are informed, "Sire, your Civilization Rating of [X]% exceeds that of even [The Famous Leader]!" For those who long to reach the top, we've provided a Civilization Rating table with the Civilization Scores required to reach each plateau by game difficulty level.

Table 9-3. Civilization Rating

Famous Leader	Chieftain Level	Warlord Level	Prince Level	King Level	Emperor Level
Solomon the Wise	6650	5320	3990	2660	1330
Emperor Augustus	6000	4800	3600	2400	1200
King Charlemagne	5400	4320	3240	2160	1080
Thomas Jefferson	4800	3840	2880	1920	960
Shogun Tokugawa	4250	3400	2550	1700	850
Franklin Roosevelt	3750	3000	2250	1500	750
Sulayman the Magnificent	3250	2600	1950	1300	650
Winston Churchill	2800	2240	1680	1120	560
Cleopatra	2400	1920	1440	960	480
Charles de Gaulle	2000	1600	1200	800	400
Vladimir Lenin	1650	1320	990	,600	330
Simon Bolivar	1350	1080	810	540	270
Otto von Bismarck	1050	840	630	420	210
Eric the Red	800	640	480	320	160
Kaiser Wilhelm	600	480	360	240	120
Louis XVI	400	320	240	160	80
Neville Chamberlain	250	200	150	100	50
Ferdinand Marcos	150	120	90	60	30
Emperor Nero	50	40	30	20	10
Dan Quayle	0	0	0	0	0

The on-screen percentages which are presented to you after your rating on the "Dan Quayle Display" are based on the following formula (with fractions rounded down):

"Dan Quayle" Display Percentages

Percentage = Civilization Score * (Difficulty Modifier / 50)

Difficulty Modifiers: 1 for Chieftain; 2 for Warlord; 3 for Prince; 4 for King; and 5 for Emperor.

Thus, end game percentage-wise, you earn 10% of your Civilization Score at the Emperor level, 8% at King, 6% at Prince, 4% at Warlord and only 2% at Chieftain. A "perfect" score of 100% would require a Civilization Score of from 1000 points (at the Emperor level) to 5000 points (at the Chieftain level).

The Hall of Fame

I bet I'll never make it to the Hall of Fame

— Pete Rose?

When starting up or ending a game of *Sid Meier's Civilization*, you are given the chance to examine the Hall of Fame. These are the top five games played on that machine based on Civilization Score percentages as described in the aforementioned Dan Quayle Chart. Each place rated gives the leader's name, the name of the civilization played and (if there is still room on the first line) the date played to. On the second line, each place rated will list the gross population of the civilization, the Civilization Score and the difficulty level played. All the current entries (except for the game just finished, if the Hall of Fame is being examined before exiting a played game) can be cleared by clicking on the **CLEAR** button.

Game Replays

Let's see that again in slow motion.

— Sam Peckinpah?

The next two features are available *only* at the successful conclusion of a complete game of *Sid Meier's Civilization*, and not merely upon retirement. A successful conclusion either has *you* conquering the world, a civilization colonizing Alpha Centauri or the game expiring at the end of some turn of the

21st century (as indicated by Table 2-1, the Difficulty Level table).

The first feature is the replay option. You will be given the choice of watching the quick replay, the full replay or saving the replay to disk. The quick replay has the computer displaying a map of the entire world with the rise and fall of each city in the game, along with a line of text on the screen announcing each event. Things will move pretty quickly, but you will be able to get a glimpse at the rise and fall of civilizations during the just completed game.

The full replay is similar to the quick replay, but *every* important game event is noted, and each appears on screen as you hit a key. Thus, you can control the speed of the screening of this replay. Saving a replay to disk will give you a complete timeline of the game written on a file called REPLAY.TXT that is explained in greater detail below.

The Replay Timeline

Time is what you make it. It's all relative.

— Albert Einstein?

As the file name REPLAY.TXT suggests, this is a "text" file that can be read, manipulated and printed out by a standard word processing program. Contained on this file is all of the information from the full replay, written in text form, line by line. A sample of a replay printout is presented below. Note that the human player (the Teutons, in this example) has his or her achievements printed in all capital letters.

2520 BC: Egyptians build the Hanging Gardens
2480 BC: Egyptians form Monarchy
2440 BC: TEUTONS FOUND THE CITY OF SU CITY
2280 BC: TEUTONS DISCOVER WRITING
2220 BC: English make peace with Babylonians
2160 BC: TEUTONS FOUND THE CITY OF CHASE
2060 BC: TEUTONS PRODUCE FIRST DIPLOMAT
2000 BC: TEUTONS: 3 CITIES; 140,000 POPULATION

*** 1:Egyptians 2:English 3:Teutons 4:Babylonians 5:Chinese 6:Mongols 7:French

1980 BC: TEUTONS DISCOVER IRON WORKING

1900 BC: Egyptians build the Colossus

1820 BC: Babylonians discover Trade

1760 BC: Babylonians produce first Caravan

1720 BC: English discover Mathematics

1640 BC: Babylonians form Monarchy

1640 BC: Chinese found the city of Canton

1640 BC: Mongols produce first Legion

1580 BC: Egyptians found the city of Heliopolis

1560 BC: Babylonians discover Mysticism

1500 BC: English found the city of Dover

1460 BC: Chinese discover Construction

1420 BC: Egyptians produce first Trireme

1300 BC: English produce first Catapult

1280 BC: Babylonians declare war on English

1240 BC: Teutons declare war on Mongols

1240 BC: English produce first Cavalry

You will see a break after the year 2000 B.C. The 2000 B.C. line indicates your current civilization size and ranking according to the PowerGraph score at that time. This type of informational break appears in the timeline every 50 game turns (which corresponds with the vertical lines on the PowerGraph itself).

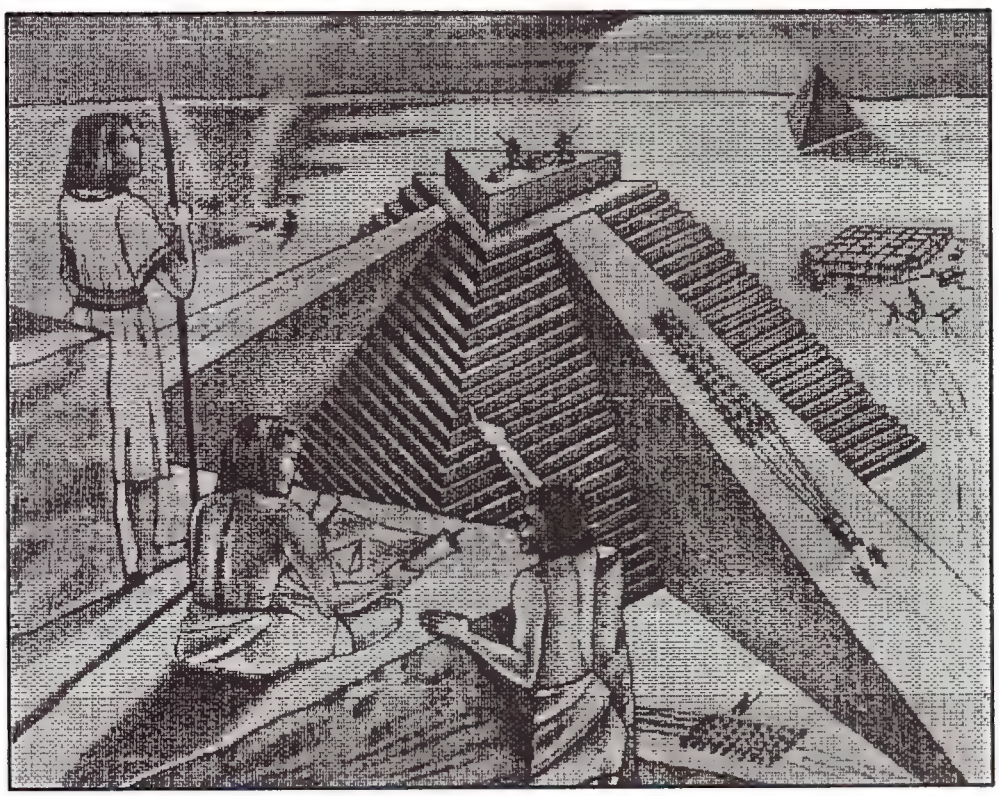
The Final Judgment of History

Close the book on civilization as we know it.

— Boris Yeltsin?

Players of *Sid Meier's Civilization* need not play just to have a good time "pushing the pieces around." The game is rife with yardsticks by which to measure player progress and little "throwaway" perks like Palace improvements and the Dan Quayle display (which have no real bearing on gameplay

whatsoever). Curious players will never have to wonder in isolation how they are doing throughout the course of a game, for history is always there to judge you and is easy to access with a few quick keystrokes.



BUT SID, YOU SAID THERE WERE ONLY MINOR CHANGES

Chapter 10

When in ROM

Lessons From Other Time Travellers

This chapter lets you reflect on your guided tour of world history by presenting both the historical lessons you should have learned in playing *Sid Meier's Civilization* and some gaming lessons we have acquired from hours of playing it ourselves, as well as listening to other "time travellers" who have enjoyed the game. The first part of this chapter should assist you in testing the concepts of historians against your personal experiences in playing the game, while the second part of the chapter should inspire you to try new and, sometimes, wicked tricks during your next foray into civilization building. We like to think of this as the left brain / right brain portion of the book as we try to summarize *Sid Meier's Civilization* in both its intellectual principles and visceral tactics.

The Lessons of History

If only the lessons of history were multiple choice.

— Herodotus?

Cynics observe that history is told by the victors. While it is possible to quibble with this observation ("losers" tend to have particularly long racial or national memories, particularly when they are oppressed), it is an especially appropriate definition of history for a computer *game* that rewards *victory*. History, in a very real sense, provides the landmarks and focal points of the past so that the listener/reader/student may discern how order rose out of chaos and, hopefully, be vigilant enough not to slip back into that morass of confusion, fear and uncertainty from which civilization arose. As Hume asserted in his *Enquiry Concerning Human Understanding*, the chief use of history is "to discover

the constant and universal principles of human nature." This chapter will attempt to delineate some of the historical landmarks that *Sid Meier's Civilization* uncovers for computer gamers.

The Civilization Definition

In the initial volume of his *magnum opus* (*The Story of Civilization*), Will Durant wrote that civilization begins where chaos and insecurity end. He asserted that it is only when fear is reduced to the extent that curiosity and creativity can be unleashed that humankind is able to move from survival and subsistence toward the "understanding and embellishment of life." To this end, Durant observed that civilization is composed of four elements which serve to remove humankind from chaos: "economic provision, political organization, moral traditions and the pursuit of knowledge and the arts."

A more recent historian, Fernand Braudel, posited in his *The Structures of Everyday Life: Civilization and Capitalism* that civilizations create order by bonding thousands of cultural possessions together, "goods that range from those of the spirit and the intellect to the tools and objects of everyday life." Like Durant, Braudel defines the emergence of civilization in terms of a corresponding improvement in quality of life.

Though many anthropologists opt for more specific definitions with regard to civilization, such as the three-tiered requirements of anthropologist Clyde Kluckhohn (towns of more than 5,000 people, writing and monumental ceremonial centers) or the ten-tiered structure of historian Gordon Childe (urban population, specialization in labor, storage for surpluses, class structure, state organization, monumental public works projects, inter-cultural trade, monumental artwork, writing and mathematics), it seems clear that civilization in the context of *Sid Meier's Civilization* means a cooperative, interdependent population which is united in an improving lifestyle. Although this "improving lifestyle" presented in the game may be more limited than that assumed by the authors of this book, this seems to be an excellent

working definition of what any civilization actually accomplishes.

That such a definition is accurate may be surmised by a statement made by Sid Meier during an on-line conference on CompuServe. Asked why the arts did not play a greater role in the game, Sid observed that his art department felt that the arts were under-represented in the game, but said, "Given the key elements of the game (food, resources and trade), we tried to select technologies and improvements which had a more direct effect on these elements." In comparison to the more direct advancements, both the religious and artistic nature of humankind is largely reduced to the role of pacifying placebo.

In short, to be civilized in terms of *Sid Meier's Civilization* means to be making *material* progress in terms of economic well-being and scientific advancement. The game has an underlying belief in such *progress*. In fact, this dogma is so strong that there is actually no problem in *Sid Meier's Civilization* that cannot be solved by human effort (using Settler units) or more technology. There are, as a correspondent named Gary Boone wrote to us shortly after the game's release, no Luddites (reactionary anti-technological activists during the Industrial Revolution) in this game's universe. It is, to paraphrase Voltaire's Dr. Pangloss, the best of all progressing worlds.

The Terrain Game

A historical lesson of major importance, which is taught early on in *Sid Meier's Civilization*, is that geographical conditions have tremendous impact on the formation of civilizations. The following considerations help shape the economic, political and social structure of a given civilization: whether the soil is fertile and conducive to cultivation; whether rainfall is adequate or fields are dependent upon irrigation to produce; whether rivers, oceans or seas offer an adequate trade route; whether a population is central to overland trade; whether the climate is conducive to brisk human efforts or lugubrious social lethargy; and whether mountain ranges discourage invasion or not.

In Chapter 3, you should have discovered that your

civilization's initial position had a significant impact on the potential production of your economy, the necessary size and strength of your military defense, the speed with which you would need to move forward with an exploration program and the exigencies of establishing peace treaties with your neighboring civilizations. Such considerations determine the viability of any emerging civilization.

The Urban Dilemma

The very term "civilization" (like the adjective, "civil") comes from the Latin word, *civis* or "citizen." This emphasizes the fact that a civilization is a concentrated population, much as a term like "urban" or "urbane" (from the Latin *urbs* or "city") or a word like "political" or "police" (from the Greek *polis* or "city-state") reminds us that cities are the building blocks of civilizations. Civilization is, of necessity, a social phenomenon in which there is a division of labor and incentive for cooperation.

Sid Meier's Civilization is extremely effective at showing the delicate balance and interrelationship between productivity, protection and pleasure. You find yourself constantly evaluating the trade-offs between economic growth, technological advancement, military advantage, political convenience and quality of life (i.e. happiness). By monitoring the happiness factors in managing your cities and encouraging civilizations to build civic improvements and wonders of the world to support this civic morale, *Sid Meier's Civilization* emphasizes the fact that it takes a motivated population to maximize its productive potential. In addition, recruiting elite citizens as entertainers, scientists and tax collectors helps you visualize the specialization of labor inherent in a growing economy. Chapter 4 and Chapter 9 offer advice on elite citizens.

Then, by presenting a fiscally conservative model (supply-side economics and no deficit spending), *Sid Meier's Civilization* delineates the relationship between fiscal policy and economic growth. Of course, purists would note that the simplified model does not really deal with the use of interest rates to adjust monetary growth or encourage spending/investment

and does not penalize excess taxation sufficiently enough to satisfy modern students of economics, whether conservative or liberal. Chapter 4 should have offered some tips on performing this juggling act between productivity, protection and pleasure in its consideration of taxation, economic institutions, political institutions and ecclesiastical institutions.

The Political Expedient

As noted in Chapter 6, Plato observed that humankind was unwilling to accept political authority until there was something to protect. In *Our Oriental Heritage*, Durant was even more blunt in his assessment. He remarked that it is war that makes the state and the individual's fear of loss that compels him or her to join with others. Then, he underscored his assertion that man is not voluntarily a political animal by cynically suggesting that a man only asks for additional laws when he is convinced that his *neighbor* needs them.

Sid Meier's Civilization teaches these principles by creating an environment where you *must* have a military establishment in order to be safe from potential surprise attacks from neighboring civilizations. Pacifists may rightly protest by contending that the victory conditions of the game are such that there can be no *cooperative* victory in which you combine with computer-controlled civilizations in order to achieve the ultimate quality of life bilaterally, but moderates and conservatives will quickly respond that the game underscores the fact that you can't trust *anybody* when *everybody* is out for themselves.

Of course, the entire debate is based on the fallacy of contradictory premises. Pacifists believe in Win-Win situations where two or more countries can advance together. Traditionalists believe the world is a closed system where matters eventually come to a Win-Lose situation and they want to make sure they are on the winning side. Since *Sid Meier's Civilization* is a strategy game, first and foremost, it strictly presents the Win-Lose perspective. Given that fact, this debate is a waste of time. Even the co-authors of this book take opposite sides of the debate, but both accept the lesson from history that states that a country must have *some* degree of

military readiness or "peace in our time" can all too easily turn into someone else's "piece of a crime." Chapter 7 should have assisted you both in terms of assuring military readiness and preparing to prosecute an offensive campaign.

The Technological Experiment

As noted earlier, *Sid Meier's Civilization* is heavily oriented toward a firm belief in the inevitability of progress. Progress enables humankind to wrangle additional productivity from the same amount of resources (whether human, monetary or natural), thereby increasing wealth and, it is hoped, quality of life. As portrayed in Chapter 5's "Pyramids of Progress" charts, *Sid Meier's Civilization* is one of the most vivid possible illustrations of how one discovery builds on another in a geometrically expanding pattern. Technology tends to create new jobs and contribute to new wealth.

One aspect of technological advancement which *Sid Meier's Civilization* does not help gamers to take seriously is the destructive capacity of technology which is every bit as real as its constructive capacity. For example, the game aspects of *Sid Meier's Civilization* allow you to prosecute a winnable nuclear war. This seems optimistic in the light of the modern world's capacity for nuclear overkill. It also does not address the fact that Nuclear units in *Sid Meier's Civilization* are more analogous to today's *tactical* (short range) missiles equipped with neutron warheads with their capacity for killing entire populations without destroying urban infrastructure, as opposed to the dirty bombs with which the U.S. bombed Japan to bring about the close of World War II.

Whether you agree with the prospect of using tactical nuclear weapons or not, it is obvious that the historical lesson to be learned from the game is that technology is predominantly benevolent. There are *some* technological detriments in *Sid Meier's Civilization* (like pollution and global warming), but the optimistic assessment of the game is that technology will solve its own problems. You must judge whether that is a valid lesson or not.

The Spiritual Factor

As noted earlier in this discussion, one of the weakest areas of the game is in its understanding of the place of the humanities (arts, philosophy and religion) in civilization. As Braudel alluded to the pulling together of spiritual matters and material considerations in order to create order, it is the humanities which pull the disparate elements of society together in acculturating experiences which teach, inspire, challenge, entertain, comfort and assure entire populations. Without this acculturating aspect of society, the populace would soon splinter into warring special interest groups.

Where *Sid Meier's Civilization* does provide recognition for the spiritual aspects of civilization is within the effects of certain religious and artistic wonders of the world. Chapter 8 should have encouraged you regarding the relevance of these monuments to the human spirit, as well as those achievements which represented technological triumphs.

The Lessons of Gaming

I coulda' been a pretender.

— Macbeth?

This section of the chapter includes a few last minute odds and ends that we wanted to make sure we included. These are mostly subtle little nuances in terms of game play which we are giving to you solely for the sake of completeness in your study of *Sid Meier's Civilization*. We hope these interesting little details will add yet another measure of insight to your next playing session.

The Ceiling Situation

There are certain building limits in the game for cities and military units. These limits were set high enough so as not to be a problem, but if you have a very large civilization going, you might encounter them. There can only be a maximum of 128 total cities on the board at once. That's a combined total for *all* players. If more than that exist and you attempt to build one, you will see the message, "Sire, our bureaucrats cannot

administer so many cities. We must remove some of our old cities before we build new ones."

Similarly, there is a limit of 150 military units *per civilization* (player) which may appear simultaneously on the board. In this case, military units include all Diplomats, Caravans and Settlers. If you attempt to build your 151st unit, you will see the message, "Sire, our population cannot support so many military units. We must eliminate some of our old units before we build new ones."

The Resident's Memory Lapse

You will only be informed *once* of the exact time which your spaceship will make planetfall on Alpha Centauri and that is upon launch. Your space ark will *always* arrive *exactly* on time, but it is up to you to remember what year/turn that is! Consequently, you may want to make a separate note of the landing date in order to know exactly when the last possible turn will be to cease light bulb production and coins and go 100% into luxury items.

The Civilization Split

Major rebellions, which rarely occur in *Sid Meier's Civilization*, include both Civil Wars and the occasional odd city switching allegiance to its neighbor. Allow us to explain these phenomena...

If a computer player's capitol is captured, but that player still has other cities left in its civilization, a civil war will break out if *all* of the following conditions exist:

- There is at least one civilization not in the game that can form a "rebellious" faction (i.e., the Babylonians have been wiped out, so the Zulus are waiting in the wings)
- There are greater than four cities remaining in the civilization that has just had its capitol captured
- The civilization that has just had its capitol captured is *larger than* your civilization.

When a civil war occurs, the civilization that just lost its capitol will get a free Palace, instantly creating a new capital

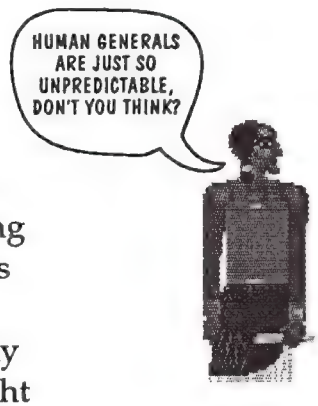
city. The "rebel" civilization will also get a free Palace and the cities of the "old empire" will be divided between the two warring factions.

One Man's Mede Is Another Man's Persian

Along the same lines as a Civil War, there are occasions when a single city on the border between two civilizations will jump ship from one to join the other. While this might only happen two or three times per game, we thought we would explain *why* this happens. Individual cities will switch allegiance if they are in Civil Disorder *or* if the balance between happy and unhappy citizens is *even* (they won't be in Civil Disorder at such a time, but are perilously close). Occasionally, with the same frequency as any other random events occur, these "malcontent" cities will look to see where the grass is greener among their nearest neighboring cities. When they find the nearby city that is happiest, they will annex themselves to that civilization. Usually, of course, these will be the original owner's cities (because cities in a civilization's heartland tend only to be near other cities belonging to that same civilization). However, "border" cities will be vulnerable if they are next to other, "happier" civilizations.

You will be notified that these malcontent cities are considering changing their allegiance when you see the random event messages of "Rioting in...," "Corruption in..." and "Scandal in..." popping up in various cities from time to time. They all mean the same thing — that particular city has just made one of these "loyalty checks."

The Democratic Downshift Dilemma



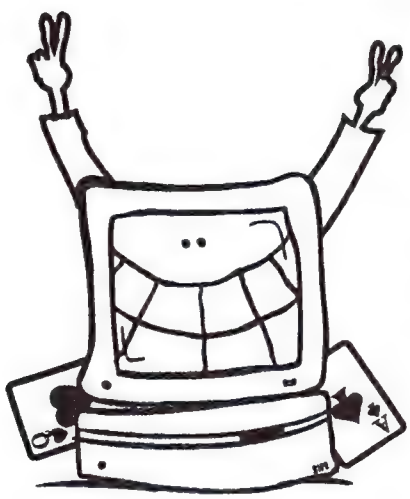
When a computer player changes from a representative government to Monarchy (or Communism, but it's usually Monarchy), the computer-controlled civilization is getting ready to attack someone. Often, that means *you*. Other warning signs of imminent attack include the massing of units on your borders, but the switch to Monarchy is a definite signal that the flag is going up and the enemy civilization plans to break whatever treaties you might

have had before the revolution. Forget any delusions of safety granted by a peace treaty and a declaration of eternal friendship. These don't mean a thing when the enemy is mobilizing.

The Truth About Computer Players

Don't worry, the ace up my sleeve is only a good luck charm.
— Doc Holliday?

There's no doubt about it: the computer players *cheat*. You shouldn't be too surprised to hear that. Artificial opponents in just about every computer game usually "cheat" in some way or another. Often the cheating only amounts to some fudging in the programming to make up the difference between a human's mental capacity and a program's algorithms. This is *not* the case in *Sid Meier's Civilization*, however. While most of the computer player cheats are selected by you when choosing the difficulty level (see Chapter 2 for a complete breakdown of the effects of choosing difficulty levels), a few exist without your control and *might* affect the outcome of the game.



The Trireme Odyssey

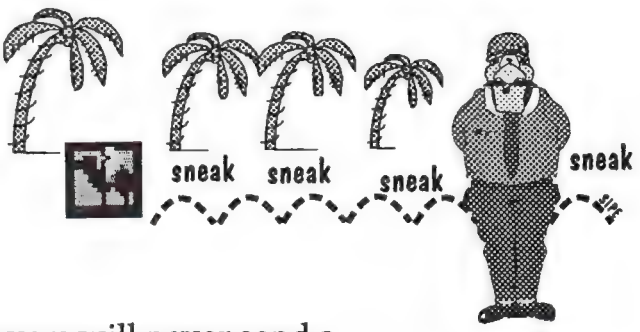
The first "cheat" concerns the Triremes of computer-controlled civilizations. Be aware that they are not bound by the same chance of loss that your Triremes would suffer if they were left out at sea. In effect, the computer's Triremes are identical to Sail units, except for their carrying capacity of *two*. Therefore, when you see an enemy Trireme pull up on the shore, *don't* assume there is land nearby in the direction from which they came. It may well have been a long, trans-oceanic voyage to your shores. The reason for this cheat is game play, according to designer Sid Meier. He felt that if you were isolated on a continent and didn't make contact with another civilization until the Age of Sail, the game would be less interesting. Consequently, the computer players enjoy this little "cheat" for your own good and the game is certainly more lively for it.

With Space, They Get Plastic Robots

In the first version of the game, there is a bug in the computer-controlled space programs (which will be fixed in subsequent versions). Basically, computer players can build spaceship components and modules with only Space Flight technology (i.e., just enough technology to build structures). Even though a computer player does not have the necessary technologies of Plastics and Robotics, they will build the spaceship components associated with those technologies because of a tiny oversight in the AI routine. Basically, when a computer player builds a spaceship structure to near completion, it asks itself, "Do I need another structure or should I switch this to a component or module before it is built?" If it decides to switch, it forgets to check to see if it has the requisite technology to actually *build* components and modules, and gets to build them anyway. Again, it will be fixed in later versions of the game.

Stealth Caravans

When have you ever seen a computer player's Caravan unit? The answer: *never*. While computer-controlled civilizations will occasionally build Diplomat units in order to steal technology from *you* alone (not to set up formal embassies with each other or subvert cities, which they never do), they will *never* move a Caravan unit around on the map (this is a "feature," not a bug).



Instead, when the computer players create a Caravan unit, it instantaneously becomes a trade route with a large, neighboring city *owned by another computer player*. Computer players will never send a Caravan your way, nor will you ever get a chance to intercept their trade. Computer player Caravans do not assist in building their wonders, either. However, the computer players can still be cheating on their wonder builds, since they can spend money to *partially* add to the shields required for a wonder's production (where, for we human players, it is an

all-or-nothing proposition). In other words, when a computer player might need 500 coins to complete a wonder, it might buy 300 coins' worth and continue building up from there while a human player would have to wait until he or she had the full 500 coins or the price was reduced due to construction completed in each successive turn.

How to Cheat

It's not cheating if they don't agree on the rules.
— Butch Cassidy?

Circling the Wagons

The lack of computer-controlled Caravans removes from their arsenal an advantage that you can enjoy. You can have a pool of Caravan units sitting around and waiting for one of your cities to begin construction of a wonder. When that happens, the Caravans can all converge on that city and complete the wonder in record time. Computer players, naturally, cannot use this technique, since they have no Caravan units to leave idling around.

The Colossal Caravan Con

Speaking of Caravans, it's a well-known feature in the game that they will assist you when building wonders of the world. Did you know that you could use them to help build *everything else*, too? "The Colossal Caravan Con," as it is known, involves having a city which is working on an expensive unit or city improvement temporarily change its production to any wonder which might be available (assuming you still have one which you can build). Then, the Caravan unit moves in and adds its shield value to the wonder. After this, it is a simple matter to switch the city's production back to the original item desired (or any other item, for that matter). Notice that all of the Caravan's shields are still in the Production Box, ready to help build

anything you care to choose! Well, you fooled that Caravan unit good, didn't you?

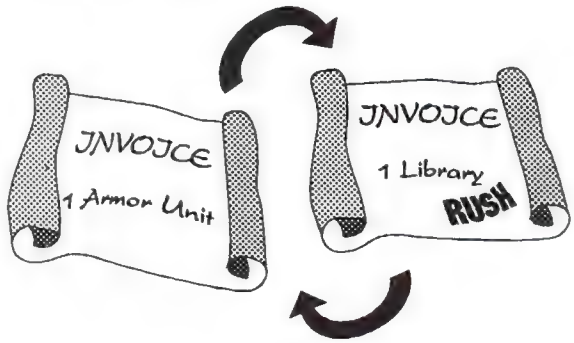
The Invoice Switching Technique

It costs more to rush the production of (i.e., purchase with coins the remaining shields for) military units as opposed to city improvements. While the game rules state accurately that city improvements cost two coins per missing shield required for completion (or four coins per missing shield if *none* are in the Production Box), the added cost for military units is based on the following formula:

$$\text{Cost} = (\text{MS} * 2) + (\text{MS} * \text{MS} / 20)$$

MS = Number of Shields "missing" (i.e., required to complete the unit)

Example: A military unit requiring 25 more shields to complete would cost 50 (25 * 2) + 31 (25 * 25 / 20), for a total of 81 coins to rush its production.



Using the Invoice Switching Technique, you should switch production from the military unit you want, to a city improvement with as close to the same shield cost as possible. For example, if you want to rush an Armor unit, change production to a Library and pay the coins for the rush job on the Library. Once the box is filled with those lovely 80 shields that you require, change the production back to the Armor unit you wanted in the first place. You just saved yourself a lot of coins by invoice switching.

A variant on this is the "Emergency Improvement Short Shrift." Since building things when there are no shields in the Production Box costs double (four coins per missing shield, as opposed to two), don't buy an expensive item from nothing. If you *must have* an expensive item from nothing (i.e., when there are no shields in the city's Production Box), select the cheapest thing on the list (like a Barracks) and rush to produce *it*. After these "expensive" (four coins per) shields are in the Production Box, switch the invoices as before to finish the

production of the item you really wanted (where the *rest* of the shields you must purchase will only cost *two* coins now, since there are some, albeit "newly added," shields currently in the Production Box). Afterwards, smoke 'em if you got 'em and consider how good life can be as a corrupt city manager (grin).

The Shield Stockpile Surprise

Another "human player cheat" is the shield stockpiling surprise. Occasionally, this will happen to you by accident (hence, the "surprise"), but you can also use it to your advantage when done deliberately. It works like this: if you don't change production after building a city improvement, the shields accumulating in the Production Box to build it again will grow forever since there cannot be two of the same improvement in the same city. Therefore, by conveniently "forgetting" to change production you can save your resources for a rainy day. This is a good way to stockpile shields in a city just prior to the discovery of some advance that will give you a new, expensive item to build that you want to get quickly (like, for instance, a wonder of the world).

Thus, during the game, you can have a city continue to build a *second* Granary (for example) by not changing production after one was just built, just prior to your discovery of Religion. That way, the Production Box will stockpile shields until Religion is finally discovered and you can change production in that city to J. S. Bach's Cathedral (for example). By using this technique, a city can be well on its way to completion of expensive items before they are even "discovered," depending on how many shields that city has managed to stockpile in its Production Box.

The Homeless Soldiers' Solution

Most government types have to pay a shield per turn to maintain military units and representative governments suffer sad faces when the troops march away from home. Wouldn't it be ideal to have a mercenary army which was not attached to any home city and could roam around at will?

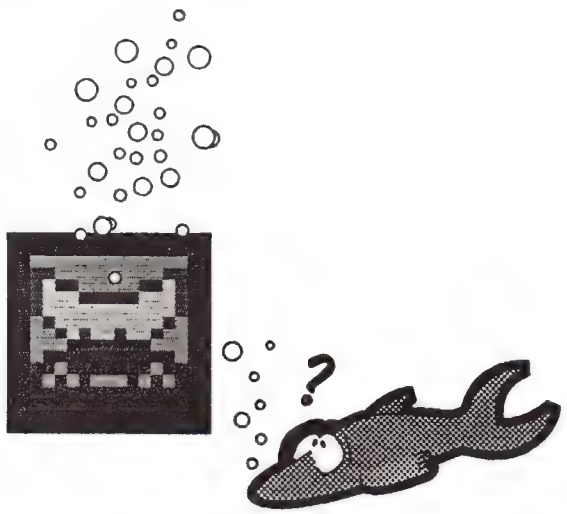
Well, you *can* do this! Each time you bribe a unit to your side that is several spaces away from any of your cities, you'll

notice it's home city is "None." This means that it costs no shield maintenance and creates no sad faces. Okay, so the cost to field a mercenary army by bribing everything that moves *can* get expensive, but isn't it nice to know you have that option and, theoretically, can win a war with enough money and Diplomats on hand?

The Aqua Engineering Enterprise

Some folks have complained that you cannot build bridges to span the short distances at sea between some continents and connect them up in *Sid Meier's Civilization*. Well, you can. Unfortunately, it's not what you are expecting.

Settler units which are loaded on ships can, naturally, be taken out over Ocean squares. While on ship, all units are "asleep" on sentry duty when being transported. However, they can be awakened and Settler units can *actually construct things at sea* if the ship that is transporting them stays in place long enough for the Settler's project to be completed (keep hitting the space bar when the transporting ship's turn to move comes around). In this manner, Roads and, more importantly, Railroads can be built onto Ocean spaces.



The bad news, however, is that land units will be quite unable to traverse these transportation lines. In other words, as bridges, they are completely useless. On a more positive and promising note, an Ocean square which contains a Railroad *will* have its production increased by 50%, the same as any other square with a Railroad. Thus, with a Railroad, a normal Ocean space has its trade production increased by one (to four) and a Fish space goes from three food and three trade to four of each. Not bad, eh?

Here's one more thing that Settlers can produce at sea, *fortresses*. Indeed, these little square-shaped beauties will double the defense of units in them, even ships! So, if there's a city you want to protect by placing a fortress outside of it, or

an inlet you wish to block, a strategically placed fortress at sea can do the job. However, if an enemy ship occupies these fortresses (remember, they cannot be destroyed once built), you could find yourself under a mighty naval blockade, indeed!

The Relay Realization

While you are floating units around on transports (meaning all ships with a "carrying capacity"), did you know that they love to "jump ship" onto other friendly transports? Like a baton getting passed in a relay race, so can units be passed between transports at sea. In fact, with careful planning, you can arrange a string of transports in such a way as to have their cargo circumnavigate the world in a single turn!

Basically, if a transport with any carrying capacity remaining moves *through* another transport parked at sea and the latter happens to have units "asleep" (on sentry duty) on board, it will pick them up (*at sea!*) and carry them. Clever players, therefore, will want to set up "chains" of ships across great oceans in order to quickly transport units back and forth across these natural barriers in a minimal number of turns. Of course, you'll want to protect these "convoy routes" with warships (and, perhaps, the fortifications at sea as described in the previous section).

One final note for all you nautical observers. If you look closely at the map, you'll notice a longitudinal point somewhere along every planet that no land masses cross. This "international date line" is where the computer AI actually "wraps" the board around, allowing you to sail from east to west (or vice versa). In other words, the world is torus-shaped and, for the curious, the dividing line is often plainly visible.

The Vicious Victory Vendetta

Here is a last hint to those who have been frustrated trying to win at the Emperor level: emulate the Mongols. Since computer civilizations enjoy the "cheats" you gave them (as outlined in Chapter 2) such as faster discovery and city growth curves, plus cheaper units and city improvements, the best way for you to keep up in the technology and building

race is to take things from other players, rather than try to outrace them. Go into "Total War" mode because stealing other civilizations' cities and technologies is the only sure way to compete at the Emperor level. Specifically, build a swarm of Chariots early on, because many players can be conquered and pillaged if they can be reached before their City Walls go up, and stick with Despotism for as long as possible, to better support your total war effort.

Additionally, in order to help you secure the most advantages available at the Emperor level, you should either play on the Earth (where you already know the basic geography and the locations of other civilizations) or on worlds with large land masses (so you can find and conquer other civilizations early, before they get too strong). In the end, though, those of you who consider yourselves to be "builders" rather than "fighters" might want to avoid the frustrations that await you at the highest difficulty level of the game, and eschew the Emperor level in favor of the King or other difficulty levels of the game.

Sid Meier's Easter Egg Hunt

Oh, a present for me?

— Pandora?

These are some surprises not documented in the game at all. What they will do is allow you to discover little ways to personalize your copy of *Sid Meier's Civilization* and have a bit of extra fun with it.

The Symbol Solution

Here's a cute, undocumented feature in *Sid Meier's Civilization* that you might enjoy. When you are given a chance to type in the name of your leader or a city name, you are not just limited to letters and numbers. Some keys produce *game symbols*, rather than just boring old letters and numbers. Table 10-1 lists all the keyboard symbols and the icons

Table 10-1.

DATA ENTRY ICONS

Keyboard Entry = Icon Displayed

= Stick Figure
$ = Coin
^ = Check Mark
{ = Wheat Stalk
} = Trade Arrows
\ = Diamond
| = Shield
~ = Light bulb
_ = Sun

they produce when you enter text into the game.

Note that in different places, these symbols might read differently (such as newspaper headlines, during parleys, etc.), but they still make for a bit of fun. Experiment around with some of these hieroglyphics and impress people who haven't read this section of the book!

The Writer's Revenge

If you have ever worked with a word processor before (and most everyone reading this book has), you are going to *love* this next little jewel. Much of the text you see in the game is located in easily edited text (.TXT) files! By simply putting them into your word processor, you can change virtually everything you read during the course of a game.

Here is a quick guide to the different text files used in *Sid Meier's Civilization* and what information you can modify in them:

Table 10-2. Text File Guide

File Name	Contents
BLURB0.TXT	Civilopedia text advances
BLURB1.TXT	Civilopedia text for improvements and wonders
BLURB2.TXT	Civilopedia text for units
BLURB3.TXT	Nothing (apparently this is a place holder)
BLURB4.TXT	Civilopedia text for governments and miscellaneous concepts
CREDITS.TXT	The credits shown at the beginning of the game
ERROR.TXT	The little error messages that pop up when you make an illegal move during game play
HELP.TXT	The "instant advice" option text plus the descriptions of the random world creation options
INTRO.TXT	Boring main intro screen
INTRO3.TXT	Same as INTRO.TXT
KING.TXT	Newspaper text; parley text; palace improvements; copy protection; endings; disasters; etc.
PRODUCE.TXT	Advisor's text telling you what to build next when using the "instant advice" feature
REPLAY.TXT	Created only if you choose to "Write a Replay to Disk" when selecting a replay option
STORY.TXT	The "In the beginning..." text printed while the world is being created

When manipulating these text files, be sure to stay within the formatting parameter of the text you are replacing. In other words, if a line is no more than 30 characters long and ends with an asterisk, you must live within those same restrictions or else it won't read correctly during your next game. Using a

bit of common sense when deducing the "format" of the lines of text is all you really need. Naturally, do not erase the non-text lines at the beginning of some of these text files. Be sure to save your changes!

The following section is examples of "edited" text to suit our individual styles of play. Try them on for size, or create your own. Remember, *Sid Meier's Civilization* is a game you are supposed to have fun with, so enjoy!

There's a lot of fun you can have with the KING.TXT file, in particular. Here are some replacement newspaper subheadlines, for example:

*NEWSD_

Giant Phallic Statue Erected

*NEWSE_

Latest Odds on Reformation

*NEWSF_

The King Will Live; Markets Plummet!

*NEWSG_

The King: Profile of a Tyrant's Tyrant

*NEWSH_

Loch Ness Monster To Wed!

*NEWSI_

Princess Pregnant With Royal "Love Child"

Of course, the STORY.TXT ("In the beginning...") can get pretty boring. Seeing it over and over again each time you start a game (and the slower your machine, the more you have to sit through each time) can put you in a bad mood to start the game. Try the following parody of *The Hitchhiker's Guide to the Galaxy* for an opening story:

In the beginning, the Universe was created.
This has made a lot of people very angry
and been widely regarded as a bad move.
Reason notwithstanding,
the Universe continues unabated.

Far out in the uncharted backwaters of the
unfashionable end of the Western Spiral arm
of the Galaxy lies a small, unregarded yellow sun.
Orbiting this at a distance of roughly
ninety million miles is an utterly insignificant
little blue-green planet whose ape-descended
life forms are so amazingly primitive that they
still think digital watches are a pretty neat idea.

This planet has a problem - which is this:
Most of the people living on it are unhappy
for pretty much of the time. Lots of the people
are mean and most of them are miserable,
even the ones with digital watches.

The wave harmonic theory of historical perception,
in its simplest form, states that history
is an illusion caused by the passage of time, and
time is an illusion caused by the passage of history.

It also states that one's perception of these
illusions is condition by three important factors:
Who you are; Where you are;
And whether or not you are wearing a digital watch.

The history of every major civilization has gone
through three distinct and recognizable phases -
those of survival, inquiry and sophistication,
otherwise known as the How, Why and Where phases.
For instance the first phase is characterized by
the question "How can we eat?" the second
by the question "Why do we eat?" and the third by
the question "Where shall we have lunch?"

The history of warfare is similarly subdivided,
though here, the phases are
Retribution, Anticipation and Diplomacy -
Thus, Retribution: "I am going to kill you
because you killed my brother," Anticipation:
"I am going to kill you because I killed YOUR brother,"
and Diplomacy: "I am going to kill MY brother and
then kill you on the pretext that your brother did it."
Welcome to my wacked out version of CIVILIZATION!

For Those Who Cannot Resist

I only took what I had coming to me.

— John Dillinger?

If you can't stand a cheat, then don't read this section of the book. In fact, tear it out right now, lest the temptation be too great for you! We're only presenting the two most common "hacks" we found for *Sid Meier's Civilization*, both of which have been presented by many persons on the GEnie, CompuServe and PRODIGY networks. The authors cannot abide a cheat, but present them in the interest of thoroughness.

The Developer's Delight

Microprose has left in a keystroke sequence in the 1.0 version of the game which allowed those who worked on the game to have some access to information which players would normally not have at their disposal. From the Main Map display, type:

[Shift] 1 2 3 4 5 6 7 8

That will activate this special "playtest mode" of the game. To turn it off, simply repeat this keystroke sequence. The first thing you'll probably notice, once you refresh the map by moving the cursor in such a way that the screen refreshes, is that the World window in the upper-left hand corner of the display looks weird. Ignore it. It still works just the same as it always did, it just *looks* weird and will go back to normal when you exit playtest mode.

While in playtest mode, the entire map is revealed and you will see every player's units moving about the board (notice the computer player's Triremes cruising across the oceans with the greatest of ease?). Furthermore, you can access other civilization's City Displays. While there, you cannot tell them what to produce, but you *can* sell off their city improvements (like their City Walls, should they happen to be in your way). Additionally, you can manipulate their population to and from the map, change their elite citizens and unfortify their units in the city. Pretty nasty stuff, eh?

For players with a conscience, rather than patently working

over your computer opponents, you can just use the extra intelligence afforded you in this playtest mode to undo your enemies. Of course, seeing the entire map is one thing (but you'll find it's still not *explored* when you found new cities and suddenly find that most of the spaces in the City Display's map are still blackened), but knowing the *secret information function keys* is yet another wicked advantage at your disposal. These are the **F7** through **F10** keys, and here is how they work:

The **F7** key will now reveal each civilization's development profile and, yes, the type overlaps and can be difficult to read. (Hey, this wasn't designed for you to be snooping around in, remember.) With each keystroke, another civilization is shown. The headings are fairly self-explanatory. The status lines of "contact" and "peace" are clear enough. If there is no status, take it as reading that it's "war." If "vendetta" appears, watch out! At the bottom are all of that civilization's technological advances to date, with white ones indicating they were the first to invent something.

The **F8** key, while in playtest mode, will show you the PowerGraph followed by the replay options menu (as explained in the previous chapter). Basically, this is a "history tool" which affords you a chance to watch your replay or save it to disk at any time.

The **F9** key, in this mode, is interesting. Along the left column are the different continents, listed as numbers in descending order indicating their size. Actually, this number represents the total number of land squares on that continent. Across the top is a listing of all the players in the game, with their respective Settler unit icons. Sprinkled throughout this table will be sets of three numbers. These numbers, and their location on this table, are significant.

The location of the numbers indicates which player has units and cities on which continents. The numbers indicate the total number of Attack Strength Points, Defense Strength Points and Cities (in that order) that a player has on that land mass. For instance, a player with a 6/1/0 on a continent only has a Catapult unit cruising around on it, while a player with a

68/48/10 has a nice empire going (ten cities) and is ready to wage a war of aggression (with 68 Attack Strength Points).

For the record, these are the numbers the computer players examine in a parley. While the formula is difficult to explain with any certainty, it should suffice to note that if one player has more Attack Strength Points than the other has Defense Strength Points on the continent where the parley is taking place, there will be demands, threats and intimidation. Furthermore, the parley formula also considers the number of cities a player has at risk on the continent where the parley is taking place, figuring that players with less at risk will be more aggressive and those with more at risk will be more easily cowed.

Finally, the **F10** key will simply allow you to examine the whole map just as it always has. The difference is that in playtest mode, it is *all* revealed, with nice, neat large colored blocks indicating the location of player's cities, while the smaller blocks with shading represent the exact location of their units. This map is interesting if you watch it faithfully each and every turn to see where the creation and migration of barbarians occurs. The patterns are fascinating, and you will notice greater frequency of barbarian uprisings at the higher difficulty levels.

Note: This playtest mode was in the 1.0 version of the game for the IBM format. Subsequent versions (version 2.0 was made available in February, 1992) have removed this "feature" and fixed some of the minor screen graphic problems, the EGA palette, the "never ending game" problem and some other tiny bugs. If you've acquired a newer version of the game, you won't be able to use the above mode of play.

The Midas Malfeasance

Finally, for all you "major sinners" out there, it has become generally known how to "hack" a saved game file so that you can artificially increase your treasury. Yes, it is possible, with the right hacking tools, to just type in the number of coins you want in your treasury when a saved game is reloaded.

Programs are known, to those who continually hone their

arcane DOS skills, which are capable of either interactively or automatically changing the byte values of saved games. These "save game editors," as they are known, allow you to change character attributes, fortify your vessels and/or increase your wealth so that you can achieve new heights in your particular game. Utilization of such "editor" programs is fine for those who have access to a major telecommunications network, but for those who do not, here are the tools which will allow you to overcome a small but important feature in *Sid Meier's Civilization* — the treasury.

By changing a two byte value in a saved game (CIVIL#.SVE, where # is the number of the saved game), you will be able to increase your bankroll to the desired level of wealth (with a maximum return on your investment being $30,000). In order to achieve such lofty financial goals, you will need to use a hex editor such as that provided in Norton Utilities or PC Tools.

The first step is to save a game (after noting how much money is in the treasury). After loading a saved game in the respective hex editor, it is merely a question of converting the decimal value of your bankroll into a hex value and then searching for that string in the file. Most hex editors offer a feature called string search which greatly facilitates this procedure.

Upon finding the correct hex string (several searches may uncover more than one location of the same string — if so, you should go back and save the game with a different amount of money), it should be replaced with the hex value of FF7F. The file offset for the hex string should be near or at 322 and 323. Upon restoring the edited save game, you should find a bank error in your favor that maximizes your account to $30,000.

If you only wish to make smaller "deposits," a smaller hex value may be substituted. Also, if you have an older version of PC Tools or Norton Utilities, the Programmer's calculator and the hex conversion utility may not be available for use. If this is so, you'll have to do the math by hand. This is achieved as follows:

Hexadecimal math is base 16. The following illustrates how letters are used to substitute for the numbers 10 through 15:

0 1 2 3 4 5 6 7 8 9 A B C D E F
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Hex numbers are notated with a lower case "h." For instance, a thirteen in decimal would be a "D" or "Dh" in hex. In order to convert a decimal number to a hex number, you must divide the decimal number by 16 and convert the remainder to its hex value. Then, keep dividing the quotient by 16 until the quotient is zero.

For example, to convert the number 295 to hex, one must do the following:

295 divided by 16 equals 18 with a remainder of 7 (7h)

The quotient is again divided by 16:

18 divided by 16 equals 1 with a remainder of 2 (2h)

Since the quotient is still not equal to zero, it is again divided by 16 as follows:

1 divided by 16 equals 0 with a remainder of 1 (1h)

By reading the hex numbers up from the bottom of the "scratch pad," the decimal value of 295 converts to a hexadecimal value of 0127, or 0127h.

The player may use this method to either determine the hex value of the money in the treasury which should be changed to FF7F and/or, to determine a lesser value if only a small change is desired. If only all bank accounts could be managed so easily.

Are We Having Fun, Yet?

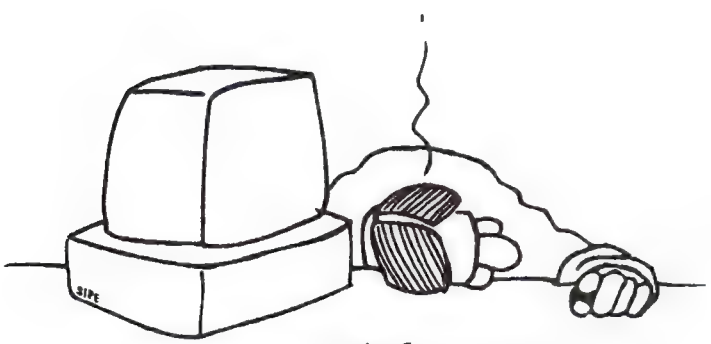
I finally proved you can change history.

— Sid Meier?

This chapter served to accomplish several similar functions. The first portion of the chapter highlighted both the historical insights that *Sid Meier's Civilization* teaches well and those that are either debatable or admittedly weak. In so doing, the text should have served to remind you of any sections of the book which you might want to reread in order to refresh your memory or shore up any weak elements in your game play.

The second portion of the chapter allowed us to cover some of the items that we may not have explained thoroughly or which we may have discovered at a late date. It also gives away several secrets that might ruin the game for novice players, but might inspire experienced players to try new experiments or challenge higher difficulty levels.

In conclusion, *Sid Meier's Civilization* is *not* a treatise on history which can be treated passively. Rather, it is a chance to "recreate" history in experimental mode with no holds barred (or, at least, very few). As David Lowenthal lectured in *The Past is a Foreign Country*, "No absolute historical truth lies waiting to be found; however assiduous and fair-minded the historian," but there *is* an assurance that historical knowledge of any kind (adjusted by the corrective lenses of future discoveries and reflection) casts *some* light on the past and offers additional insights concerning the present. It is our hope that *our* insights and analysis concerning *Sid Meier's Civilization* and history in general will enhance your future enjoyment of the game and pique your interest in historical study. *Excelsior!*



THE END . . .

of Sid Meier's Civilization
as we know it!

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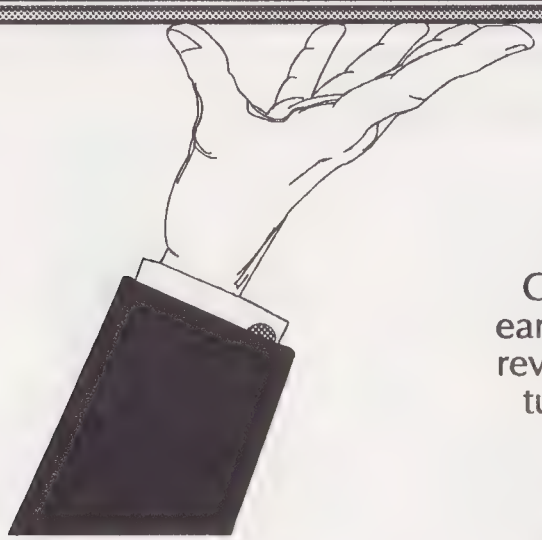

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